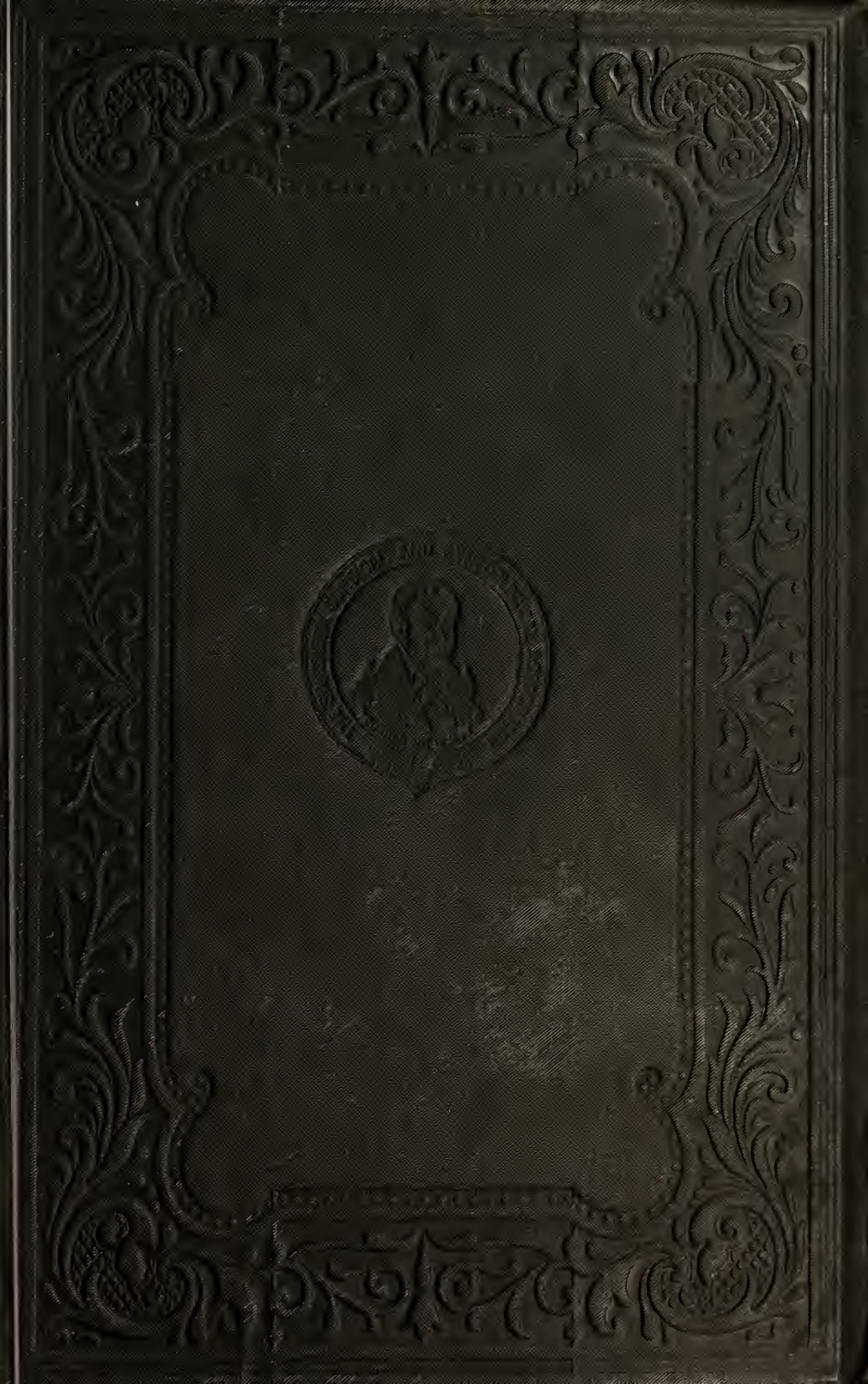

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1915

The Association does not hold itself responsible for the views enunciated in the papers and discussions published in this volume.

W. D. HAGGARD, M.D., *Secretary*,
NASHVILLE, TENN.

DORNAN, PRINTER
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1888.	*W. D. Haggard.	R. D. Webb. J. W. Sears.	*W. E. B. Davis.	Hardin P. Cochrane.
1889.	*Hunter M. McGuire.	W. O. Roberts. *Bedford Brown.	*W. E. B. Davis.	Hardin P. Cochrane.
1890.	*George J. Engelmann.	*Berthold E. Hadra. Duncan Eve.	*W. E. B. Davis.	Hardin P. Cochrane.
1891.	Lewis S. McMurtry.	*J. McFadden Gaston. J. T. Wilson.	*W. E. B. Davis.	Hardin P. Cochrane.
1892.	*J. McFadden Gaston.	*Cornelius Kollock. George Ben Johnston.	*W. E. B. Davis.	Hardin P. Cochrane.
1893.	*Bedford Brown.	*Joseph Price. George A. Baxter.	*W. E. B. Davis.	Hardin P. Cochrane.
1894.	*Cornelius Kollock.	A. B. Miles. J. B. S. Holmes.	*W. E. B. Davis.	Hardin P. Cochrane.
1895.	Lewis McLane Tiffany.	Ernest S. Lewis. Manning Simons.	*W. E. B. Davis.	*Richard Douglas.
1896.	Ernest S. Lewis.	Joseph Taber Johnson. *Richard Douglas.	*W. E. B. Davis.	*A. M. Cartledge.
1897.	George Ben Johnston.	W. E. Parker. Floyd W. McRae.	*W. E. B. Davis.	*A. M. Cartledge.
1898.	*Richard Douglas.	*H. H. Mudd. James A. Goggans.	*W. E. B. Davis.	*A. M. Cartledge.
1899.	Joseph Taber Johnson.	F. W. Parham. W. L. Robinson.	*W. E. B. Davis.	*A. M. Cartledge.
1900.	*A. M. Cartledge.	*Manning Simons. W. P. Nicolson.	*W. E. B. Davis.	W. D. Haggard.
1901.	*Manning Simons.	George H. Noble. L. C. Bosher.	W. D. Haggard.	Floyd W. McRae.
1902.	*W. E. B. Davis.	J. Wesley Bovée. J. W. Long.	W. D. Haggard.	Floyd W. McRae.
1903.	J. Wesley Bovée.	Christopher Tompkins. Bacon Saunders.	W. D. Haggard.	Floyd W. McRae.
1904.	Floyd W. McRae.	George S. Brown. J. Shelton Horsley.	W. D. Haggard.	Charles M. Rosser.
1905.	Lewis C. Bosher.	J. D. S. Davis. I. S. Stone.	W. D. Haggard.	Charles M. Rosser.
1906.	George H. Noble.	Stuart McGuire. E. Denegre Martin.	W. D. Haggard.	Charles M. Rosser.
1907.	Howard A. Kelly.	Rufus E. Fort. Hubert A. Royster.	W. D. Haggard.	Charles M. Rosser.
1908.	F. W. Parham.	Henry D. Fry. W. F. Westmoreland.	W. D. Haggard.	Stuart McGuire.
1909.	Stuart McGuire.	John Young Brown. R. S. Cathcart.	W. D. Haggard.	Wm. S. Goldsmith.
1910.	W. O. Roberts.	Joseph C. Bloodgood. Lewis C. Morris.	W. D. Haggard.	Wm. S. Goldsmith.
1911.	Rudolph Matas.	Guy L. Hunner. J. Garland Sherrill.	W. D. Haggard.	Wm. S. Goldsmith.
1912.	J. M. T. Finney.	J. E. Thompson. W. P. Carr.	W. D. Haggard.	Wm. S. Goldsmith.
1913.	John Young Brown.	Ap Morgan Vance. Lomax Gwathmey.	W. D. Haggard.	Le Grand Guerry.
1914.	John W. Long.	A. C. Scott. James F. Mitchell.	W. D. Haggard.	Le Grand Guerry.
1915.	Bacon Saunders.	Thomas S. Cullen. S. M. D. Clark.	W. D. Haggard.	Le Grand Guerry.

* Deceased.

HONORARY MEMBERS

1894.—Foy, George	Dublin.
Founder.—Herff, Ferdinand	San Antonio, Texas.
1894.—Jacobs, Charles	Brussels.
1889.—Johnson, Joseph Taber,	Washington, D. C.
1910.—Jones, Robert	Liverpool.
1910.—Lane, Arbuthnot	London.
1894.—Martin, A.	Berlin.
1902.—Maury, Richard B.	Memphis, Tenn.
1894.—Morisani, O.	Naples.
1910.—Morison, Rutherford	New-Castle-on-Tyne.
1910.—Moynihan, B. G. A.	Leeds.
1910.—Myles, Thomas, Sir	Dublin.
1894.—Pozzi, S.	Paris.
1910.—Robson, Mayo	London.
Founder.—Schilling, Nicholas,	Cedar Bayou, Texas.
1910.—Stiles, H. J.	Edinburgh.
1907.—Tiffany, L. M.	Baltimore, Md.

MEMBERS

* Deceased.

1908.—Abell, Irvin, M.D. Professor of Principles and Practice of Surgery and Clinical Surgery, Medical Department, University of Louisville; Visiting Surgeon, University Hospital, Louisville City Hospital, and St. Mary and Elizabeth Hospital. 1228 Second St., Louisville, Ky.

1911.—Allen, Carroll W., M.D. 1312 Louisiana Ave., New Orleans, La.

1914.—Bailey, Fred Warren, B.Sc., M.D. Assistant Professor of Surgery, St. Louis University School of Medicine; Associate Chief Surgeon, St. John's Hospital; Visiting Gynecologist, St. Louis City Sanitarium. 633 Metropolitan Building, St. Louis, Mo.

1905.—Baker, James Norment, M.D. Visiting Surgeon, St. Margaret's Hospital; Secretary of the Medical Association of the State of Alabama. 719 Madison Avenue, Montgomery, Ala.

1894.—Baldridge, Felix E., M.D. Huntsville, Ala.

1903.—Balloch, Edward A., M.D. Professor of Surgery, Medical Department of Howard University; Surgeon to Freedmen's Hospital; Member American Academy of Medicine. 1511 Rhode Island Avenue, N. W., Washington, D. C.

1908.—Barr, Richard Alexander, M.D. Professor of Surgery and Clinical Surgery, Medical Department of Vanderbilt University; late Major of First Tennessee Infantry, U. S. A. First National Bank Building, Nashville, Tenn.

1905.—Barrow, David, M.D. Ex-President Kentucky State Medical Society. 148 Market Street, Lexington, Ky.

1905.—Bartlett, Willard, M.D. Surgeon to St. Anthony's Hospital. 4257 Washington Boulevard, St. Louis, Mo.

1901.—Baughman, Greer, M.D. Lecturer on Hygiene; Demonstrator of Pathology; Demonstrator of Physiology; in charge of Gynecological Dispensary at Medical College of Virginia. 26 North Laurel Street, Richmond, Virginia.

1907.—Bevan, Arthur Dean, M.D. Professor of Surgery, Rush Medical College, University of Chicago. 100 State Street, Chicago, Ill.

1908.—Blair, Vilray Papin, A.M., M.D. Metropolitan Building, St. Louis, Mo.

1906.—Bloodgood, Joseph Colt, M.D. Associate Professor of Surgery, Johns Hopkins University; Associate Surgeon, Johns Hopkins Hospital; Surgeon to the Union Protestant Infirmary; Chief Surgeon to St. Agnes' Hospital. *Vice-President*, 1910. 904 North Charles Street, Baltimore Maryland.

1893.—Bloom, J. D., M.D. Consulting Surgeon, Touro Infirmary; Lecturer on Diseases of Children, Tulane University. New Orleans, La.

1901.—Boldt, Hermann J., M.D. Gynecologist to Post-Graduate Hospital, St. Mark's Hospital, German Polyclinic; Consulting Gynecologist to the Beth Israel Hospital and to St. Vincent's Hospital; Professor of Gynecology, Post-Graduate Medical School; Member of the Gynecological Society of Germany; Fellow of the American Gynecological Society; Fellow of the Royal Society of Medicine (London); ex-President of the New York Obstetrical Society; of the German Medical Society of New York; of the Section of Obstetrics of the New York Academy of Medicine. 39 East Sixty-first Street, New York, N. Y.

1902.—Bonifield, Charles Lybrand, M.D. Professor of Clinical Gynecology, Medical College of Ohio (Medical Department University of Cincinnati); Member American Association of Obstetricians and Gynecologists; ex-President Cincinnati Academy of Medicine; ex-President Cincinnati Obstetrical Society. 409 Broadway, Cincinnati, Ohio.

1911.—Borden, W. C., M.D. Professor of Surgery and Dean, George Washington University; Surgeon-in-Chief to the George Washington University Hospital. 1801 California St., Washington, D.C.

1890.—Bosher, Lewis Crenshaw, M.D. Professor of Practice of Surgery and Clinical Surgery in the Medical College of Virginia; Visiting Surgeon to the Memorial Hospital; Member of American Surgical Association; Member of the American Association of Obstetricians and Gynecologists; Member of Association of American Anatomists; Member of American Urological Association; ex-President of Richmond

Academy of Medicine and Surgery. *Vice-President,* 1901; *President,* 1905. 422 East Franklin Street, Richmond, Va.

1895.—Bovée, J. Wesley, M.D. Fellow of American Gynecological Society; President of Washington Obstetrical and Gynecological Society; ex-President Medical and Surgical Society of the District of Columbia; Honorary Fellow Medical Society of Virginia; Professor of Gynecology of George Washington University, Washington, D. C.; Gynecologist to Providence, Columbia, and George Washington University Hospitals; Consulting Physician to St. Ann's Infant Asylum, and Attending Gynecologist to St. Elizabeth's Hospital for the Insane, Washington, D. C. *Vice-President,* 1902; *President,* 1903; Member of *Council,* 1903-1906. The Rochambeau, Washington, D. C.

1905.—Brown, John Young, M.D. Formerly Surgeon-in-Charge, St. Louis City Hospital; President of the American Association of Obstetricians and Gynecologists, 1906. *Vice-President,* 1909; *President,* 1013. Metropolitan Building, St. Louis, Mo.

1908.—Bryan, Robert C., M.D. Professor of Descriptive Anatomy, University of Medicine, Visiting Surgeon to the Virginia Hospital. First and Main Streets, Richmond, Va.

1910.—Bryan, W. A., M.D. Professor of Surgery and Clinical Surgery, Vanderbilt University; Professor of Oral Surgery, Dental Department, Vanderbilt University. 146 Eighth Avenue, N., Nashville, Tenn.

1913.—Buist, A. Johnston, M.D. Professor of Gynecology, Medical College of the State of South Carolina; Visiting Gynecologist, Roper Hospital. 279 Meeting Street, Charleston, S. C.

1907.—Burch, Lucius E., M.D. Professor of Gynecology, Vanderbilt University, Medical Department; Gynecologist, Nashville City Hospital; Captain and Surgeon, N. G. S. T. 706 Church Street, Nashville, Tenn.

1899.—Burthe, L., M.D. 124 Baronne Street, New Orleans, La.

1900.—Byford, Henry T., M.D. Professor of Gynecology and Clinical Gynecology, College of Physicians and Surgeons (University of Illinois); Professor of Gynecology, Post-Graduate Medical School of Chicago; Surgeon to Woman's Hospital, etc. Peoples Gas Bldg., Chicago, Ill.

1912.—Caldwell, C. E., A.M., M.D. Clinical Professor of Surgery and Associate Professor of Surgical Anatomy in Medical Department, University of Cincinnati; Surgeon to Cincinnati General Hospital. 1110 Cross Lane, Cincinnati, Ohio.

1910.—Caldwell, Robert, M.D. Professor of Surgical Anatomy, Vanderbilt University; ex-President Nashville Academy of Medicine. 315 Jackson Building, Nashville, Tenn.

1906.—Cannady, John Egerton, M.D. Former Surgeon-in-Charge to Sheltering Arms Hospital, Hansford, W. Va.; Fellow of the American Association of Obstetricians and Gynecologists; Non-resident Honorary Fellow of the Kentucky State Medical Society; Fellow of the West Virginia Medical Association, Virginia Medical Society, Tri-State Society of Virginia and the Carolinas, American Association of Railway Surgeons. Coyle and Richardson Building, Charleston, W. Va.

1904.—Carothers, Robert, M.D. Professor of Clinical Surgery, Medical College of Ohio, Medical Department Cincinnati University; Surgeon to the Good Samaritan Hospital; 413 Broadway, Cincinnati, Ohio.

1903.—Carr, William P. M.D. Professor of Physiology and Professor of Clinical Surgery, Columbian University; Surgeon to the Emergency Hospital and University Hospital; Consulting Surgeon to the Washington Asylum Hospital and the Government Hospital for the Insane, Washington, D. C. *Vice-President*, 1912. 1418 L Street, N. W., Washington, D. C.

1899.—Cathcart, R. S., M.D. Assistant to Chair of Clinical Surgery in the Medical College of the State of South Carolina. *Vice-President*, 1909. 66 Hasell Street, Charleston, South Carolina.

1904.—Chambers, P. F., M.D. Attending Surgeon, Woman's Hospital; Consulting Surgeon, French Hospital. 49 West Fifty-seventh Street, New York, N. Y.

1907.—Clark, John G., M.D. Professor of Gynecology, University of Pennsylvania; Gynecologist-in-Chief, University Hospital. 2017 Walnut Street, Philadelphia, Penna.

1907.—Clark, S. M. D., M.D. Associate Professor Gynecology, Tulane Medical Department; Visiting Surgeon, Charity Hospital. 1435 Harmony Street, New Orleans, La.

1893.—Cocram, Henry S., M.D. 108 Baronne Street, New Orleans, La.

1908.—Coffey, Robert C., M.D. Secretary Oregon State Board of Medical Examiners; Councellor Oregon State Medical Association. Corbett Building, Portland, Oregon.

1909.—Cole, Herbert Phalon, M.D. Instructor in Gynecology and Clinical Diagnosis, Medical Department of the University of Alabama; Gynecologist to City Hospital of Mobile. 202 Conti Street, Mobile, Ala.

1902.—Coley, William B., M.D. Clinical Lecturer on Surgery, College of Physicians and Surgeons; Assistant Surgeon in Hospital for Ruptured and Crippled; Attending Surgeon to General Memorial Hospital; Fellow of the American Surgical Association, New York Surgical Society, and New York Academy of Medicine. 40 East Forty-first Street, New York, N. Y.

1914.—Cousins, William Lewis, M.D. Surgeon-in-Chief, St. Barnabas Hospital; Consulting Surgeon, Maine General Hospital. 231 Woodford Street, Portland, Maine.

1907.—Crawford, Walter W., M.D. Ex-President Southern Medical Association; ex-President Perry County Medical Society; ex-President Mississippi State Medical Association; Surgeon to South Mississippi Infirmary. Hattiesburg, Miss.

1902.—Crile, George W., M.D. Professor of Clinical Surgery, Medical College of Western Reserve University; Surgeon to St. Alexis' Hospital; Surgeon to Lakeside Hospital. 1021 Prospect Street, Cleveland, Ohio.

1908.—Crisler, Joseph Augustus, M.D. Professor of Anatomy and Operative Surgery, College of Physicians and Surgeons, Memphis, Tennessee; Lecturer on Minor Surgery, Medical Department, University of Mississippi; ex-Member Mississippi State Board of Health and Medical Examiners; ex-Vice-President Mississippi State Medical Association and Tri-State Medical Association. Memphis Trust Building, Memphis, Tenn.

1906.—Cullen, Thomas Stephen, M.D. Associate Professor of Gynecology, Johns Hopkins University; Associate in Gynecology, Johns Hopkins Hospital; Consultant in Abdominal Surgery, Church Home and Infirmary. Fellow of the American Gynecological Society; Honorary Member to La Societa Italiana Ostettricia Ginecologia, Rome; Corresponding Member of the Gesellschaft f. Geburtshülfe, Leipzig. 3 West Preston Street, Baltimore, Md.

Founder.—Cunningham, Russell M., M.D. Professor of Practice of Medicine and Clinical Medicine, Birmingham Medical College; Surgeon to the Pratt Mines Hospital. Ensley, Ala.

1906.—Cushing, Harvey, M.D. Professor of Surgery in the Harvard University. 305 Walnut Street, Brookline, Mass.

1907.—Danna, James A., M.D. Chief Visiting Surgeon, Charity Hospital. Charity Hospital, New Orleans, Louisiana.

Founder.—Davis, John D. S., M.D., LL.D. Professor in the Post-graduate School of Medicine of the University of Alabama; Surgeon to Hillman Hospital; ex-President of the Jefferson County Medical Society; Vice-President of the American Obstetricians and Gynecologists, 1909. *Vice-President*, 1905. Avenue G and Twenty-first St., Birmingham, Ala.

1910.—Davis, John Staige, M.D. Instructor in Surgery, Johns Hopkins University; Assistant Surgeon to the Out-Patient Department of Johns Hopkins Hospital; Visiting Surgeon to the Union Protestant Infirmary, Visiting Surgeon to the Church Home and Infirmary. 1200 Cathedral Street, Baltimore, Md.

1900.—Deaver, John B., M.D. Surgeon-in-Chief to the German Hospital. 1634 Walnut Street, Philadelphia.

1897.—Dorsett, Walter B., M.D. Professor of Obstetrics and Clinical Gynecology, St. Louis University; Gynecologist to the Missouri Baptist Sanitarium and to Evangelical Deaconess' Hospital. 5070 Washington Boulevard St. Louis, Mo.

1896.—Doughty, W. H., M.D. Professor of Special Surgery and Surgical Pathology, Medical Department, University of Georgia; Chief Surgeon to Charleston and Western Carolina Railroad. 822 Greene Street, Augusta, Ga.

1914.—Downes, William Augustus, M.D. Assistant Professor of Clinical Surgery, Columbia University, College of Physicians and Surgeons; Attending Surgeon General Memorial and Babies' Hospitals; Associate Attending Surgeon, St. Luke's Hospital and Hospital for Ruptured and Crippled. 37 West Seventy-first Street, New York, N. Y.

1890.—Earnest, John G., M.D. Professor of Clinical Gynecology, College of Physicians and Surgeons; formerly Professor of Gynecology, Southern Medical College; Visiting

Gynecologist to the Grady Hospital. 828 Candler Building, Atlanta, Ga.

1907.—Elbrecht, Oscar Herman, M.D. Superintendent and Surgeon-in-Charge of St. Louis Female Hospital; Vice-President, St. Louis Obstetrical and Gynecological Society; Visiting Surgeon on City Hospital Staff. Metropolitan Building, St. Louis, Mo.

1891.—Elkin, William Simpson, M.D. Professor of Operative and Clinical Surgery, Atlanta College of Physicians and Surgeons; ex-President of the Atlanta Society of Medicine; Surgeon to Grady Hospital. 27 Luckie St., Atlanta, Ga.

1904.—Finney, J. M. T., M.D. Associate Professor of Surgery, Johns Hopkins University; Surgeon to Outpatients, Johns Hopkins Hospital. *President*, 1912. 1300 Eutaw Place, Baltimore, Md.

1901.—Fort, Rufus E., M.D. Chief Surgeon, Nashville Terminal Company; Surgeon to Tennessee Central Railroad; Surgeon to Nashville Hospital; *Vice-President*, 1907. 209 Seventh Avenue, N., Nashville, Tenn.

1905.—Frank, Louis, M.D. Professor of Surgery and Clinical Surgery, University of Louisville; Visiting Surgeon to the Louisville City Hospital. 400 Atherton Building, Louisville, Ky.

1902.—Freiberg, Albert H., M.D. Professor of Orthopedic Surgery in the Medical College of Ohio, Medical Department of the University of Cincinnati; Orthopedic Surgeon to the Cincinnati Hospital and to the Jewish Hospital of Cincinnati. 19 West Seventh Street, Cincinnati, Ohio.

1895.—Fry, Henry D., M.D. Professor of Obstetrics, Georgetown University; *Vice-President*, 1908. 1601 Connecticut Avenue, N. W., Washington, D. C.

1903.—Gale, Joseph A., M.D. Surgeon-General Norfolk and Western R. R.; ex-President of Medical Society of Virginia. Roanoke, Va.

1913.—Gibbon, R. L., M.D. Charlotte, N. C.

1897.—Glasgow, Frank A., M.D. Professor of Clinical Gynecology of St. Louis Medical College; Gynecologist to St. Louis Mullanphy Hospital; on staff of Martha Parsons Free Hospital; Consulting Surgeon to St. Louis Female Hospital. 3894 Washington Boulevard, St. Louis, Mo.

Founder.—Goggans, James A., M.D. Ex-President of the Tri-State Medical Society of Alabama, Georgia, and Tennessee; Senior Councillor of the Medical Association of the State of Alabama; Fellow of the British Gynecological Society. *Vice-President*, 1898. Alexander City, Ala.

1900.—Goldsmith, W. S., M.D. *Treasurer*, 1909–1912. 262 Jackson Street, Atlanta, Ga.

1892.—Grant, Horace H., M.D. Professor of Surgery in the Hospital College of Medicine; Surgeon to the Louisville City Hospital. 321 Equitable Building, Louisville, Ky.

1905.—Guerry, Le Grand, M.D. Surgeon, Columbia Hospital. *Treasurer*. Columbia, S. C.

1896.—Gwathmey, Lomax, M.D. Attending Gynecologist to St. Vincent Hospital and Dispensary. *Vice-President*, 1913. Norfolk, Va.

1896.—Haggard, William David, M.D. Professor of Surgery and Clinical Surgery, Vanderbilt University. Surgeon St. Thomas Hospital, Vanderbilt and City Hospitals. *Treasurer*, 1900; *Secretary*. 148 Eighth Avenue, N., Nashville, Tenn.

1910.—Hagner, Francis Randall, M.D. Professor of Genito-urinary Surgery, George Washington University; Attending Genito-urinary Surgeon, George Washington University Hospital; Attending Surgeon, Garfield Memorial Hospital. The Farragut, Washington, D. C.

1892.—Hall, Rufus Bartlett, A.M., M.D. Professor of Clinical Gynecology in the Miami Medical College; Gynecologist to the Presbyterian Hospital; ex-President of the Cincinnati Obstetrical Society; ex-President of the American Association of Obstetricians and Gynecologists; Fellow of British Gynecological Society. 628 Elm Street, Cincinnati, O.

1910.—Hanes, Granville S., M.D. Professor of Surgery of the Rectum and Intestinal Diseases, Medical Department of the University of Louisville; Surgeon to the Louisville City Hospital. The Atherton Building, Louisville, Ky.

1901.—Hazen, Charles M., M.D. Professor of Physiology, Medical College of Virginia. Bon Air (Richmond), Va.

1896.—Heflin, Wyatt, M.D. Ex-President of the Jefferson County Medical Society. Birmingham, Ala.

1905.—Hendon, George A., M.D. Professor of Surgery and Clinical Surgery, University of Louisville. 968 Baxter Avenue, Louisville, Ky.

1889.—Hill, Robert Somerville, M.D. Gynecologist to the Laurel Hill Hospital; Senior Councillor of the Medical Association of the State of Alabama; ex-President of the Montgomery County Medical and Surgical Association; former Surgeon of the Second Regiment, Alabama State Militia. Montgomery, Ala.

1902.—Hirst, Barton Cooke, M.D. Professor of Obstetrics, University of Pennsylvania; Fellow of College of Physicians, Philadelphia; Gynecologist to the Howard, Orthopedic, and Philadelphia Hospitals; Fellow of American Gynecological Society. 1821 Spruce Street, Philadelphia, Pa.

1913.—Hodgson, Fred G., M.D. Assistant in Orthopedics, Atlanta Medical College; Orthopedic Surgeon Wesley Memorial Hospital and MacVicar Hospital of Spelman Seminary; Junior Orthopedic Surgeon Grady Memorial Hospital. 72 West Peachtree Street, Atlanta, Ga.

1911.—Hogan, Edgar P., M.D. 800 South Twentieth St., Birmingham, Ala.

1906.—Holden, Gerry R., M.D. Formerly House Surgeon, Roosevelt Hospital, New York City; formerly Resident Gynecologist, Johns Hopkins Hospital, and Assistant in Gynecology, Johns Hopkins Medical School. 223 West Forsyth Street, Jacksonville, Fla.

1891.—Holmes, J. B. S., M.D. Ex-President of the Tri-State Medical Society of Alabama, Georgia, and Tennessee; ex-President of the Georgia Medical Association; Fellow of the American Association of Obstetricians and Gynecologists. *Vice-President*, 1894. Tampa Bay Hotel Park, Tampa, Florida.

1900.—Horsley, John Shelton, M.D. Professor of Principles of Surgery and Clinical Surgery, Medical College of Virginia; Surgeon to Memorial Hospital. *Vice-President*, 1904. 617 West Grace Street, Richmond, Va.

1896.—Hundley, J. Mason, M.D. Associate Professor of Diseases of Women and Children, University of Maryland; President Clinical Society of Baltimore. 1009 Cathedral Street, Baltimore, Md.

1903.—Hunner, Guy Le Roy, M.D. Associate in Gynecology, Johns Hopkins University; Professor of Genito-Urinary Surgery, Woman's Medical College of Baltimore; Gynecologist-in-Chief, St. Agnes' Hospital; Visiting Gynecologist, Church Home and Hebrew Hospital, Baltimore,

Frederick City Hospital, Frederick, Md., and Hagerstown Hospital, Hagerstown, Md.; Consulting Gynecologist, Brattleboro Memorial Hospital, Brattleboro, Vt. *Vice-President*, 1911. 2305 St. Paul Street, Baltimore, Maryland.

1900.—Ill, Edward Joseph, M.D. Surgeon to the Woman's Hospital; Medical Director, St. Michael's Hospital Gynecologist and Supervising Obstetrician, St. Barnabas' Hospital; Consulting Gynecologist to German Hospital and Beth Israel Hospital of Newark, N. J.; to All Souls' Hospital, Morristown, N. J., and to Mountain Side Hospital, Montclair N. J.; Vice-President from New Jersey to Pan-American Congress of 1893. 1002 Broad Street, Newark, N. J.

1912.—Jackson, William R., M.D. Professor of Surgery to the Medical Department of the University of Alabama; Consulting Surgeon to the City Hospital and Southern Infirmary, Mobile, Ala. 164 St. Michael Street, Mobile, Ala.

Founder.—Johnston, George Ben, M.D. Formerly Consulting Surgeon to the Richmond Eye, Ear, and Throat Infirmary; ex-President of the Richmond Academy of Medicine and Surgery; ex-President of the Medical Society of Virginia; Member of the American Association of Obstetricians and Gynecologists, and First Vice-President, 1896; Member of the Ninth International Medical Congress; Member of the American Surgical Association; Professor of the Practice of Surgery and Clinical Surgery in the Medical College of Virginia, and formerly Professor of Anatomy; Surgeon to the Old Dominion Hospital; Consulting Surgeon to the City Free Dispensary. *Vice-President*, 1892; *President*, 1897. 407 East Grace Street, Richmond, Va.

1908.—Jonas, Ernst, M.D. Clinical Professor of Surgery, Medical Department, Washington University; Chief of Surgical Clinic, Washington University Hospital; Gynecologist to the Jewish Hospital; Surgeon to the Martha Parsons Hospital for Children; Fellow of the American Association of Obstetricians and Gynecologists. 4495 Westminster Place, St. Louis, Mo.

1910.—Jones, Edward Groves, A.B., M.D. Professor of Surgery, Atlanta School of Medicine; Surgeon to Tabernacle Infirmary; Gynecologist to Wesley Memorial Hospital. Fourth National Bank Building, Atlanta, Ga.

1902.—Jordan, William Mudd, M.D. Surgeon to St. Vincent's Hospital; Gynecologist to Hillman Hospital; formerly Assistant Surgeon, U. S. Marine Hospital Service. Birmingham, Ala.

1912.—Judd, Edward Starr, M.D. Surgeon to St. Mary's Hospital, Rochester, Minn.

1890.—Kelly, Howard Atwood, M.D. Founder of Kensington Hospital, Philadelphia; Associate Professor of Obstetrics, University of Pennsylvania, 1888-89; Professor of Gynecology and Obstetrics, Johns Hopkins University, 1888-99; Professor of Gynecology, Johns Hopkins University; Gynecologist-in-Chief to Johns Hopkins Hospital; Member Associé Etranger de la Société Obstétricale et Gynécologique de Paris; Correspondirendes Mitglied der Gesellschaft f. Geburtshülfe zu Leipzig; Honorary Fellow Edinburgh Obstetrical Society, Royal Academy of Medicine (Ireland), and British Gynecological Society; Member Washington Academy of Sciences; Fellow of the American Gynecological Society. *President*, 1907. 1418 Eutaw Place, Baltimore, Maryland.

1907.—Kirchner, Walter C. G., M.D. Formerly Surgeon-in-Charge, St. Louis City Hospital. 508 Metropolitan Building, St. Louis, Mo.

1899.—Kohlman, William, M.D. 3500 Prytania Street New Orleans, La.

1913.—LaRoque, G. Paul, M.D. Associate Professor of Surgery, Medical College of Virginia; Surgeon, Memorial Hospital. 501 East Grace Street, Richmond, Va.

1914.—Landry, Lucian, M.D. Assistant Demonstrator in Operative Surgery and Instructor in Clinical Surgery, Tulane University of Louisiana, School of Medicine; Junior Surgeon, Touro Infirmary; Visiting Surgeon, Charity Hospital. 2255 St. Charles Avenue, New Orleans, La.

1894.—Leigh, Southgate, M.D. Visiting Surgeon to St. Vincent's and Norfolk Protestant Hospitals; First Vice-President Medical Society of Virginia, 1899-1900. 147 Granby Street, Norfolk.

1912.—Lewis, Bransford, M.D. Century Building, St. Louis, Mo.

1914.—Lewis, Dean, A.B., M.D. Associate Professor of Surgery, Rush Medical College; Attending Surgeon, Presbyterian Hospital; Consulting Surgeon, Anne W. Durand Hospital of the Memorial Institute for Infectious Diseases. 122 South Michigan Avenue, Chicago, Ill.

1893.—Lewis, Ernest S., M.D. Professor of Gynecology, Medical Department of Tulane University. *Vice-President*, 1895; *President*, 1896; *Member of Council*, 1896-1903. 124 Baronne Street, New Orleans, La.

1900.—Lloyd, Samuel, M.D. Professor of Surgery, New York Post-Graduate Medical School; Attending Surgeon to the Post-Graduate Hospital and St. Francis' Hospital, and Consulting Surgeon to the Benedictine Sanitarium at Kingston, N. Y. 12 West Fiftieth Street, New York, N. Y.

Founder.—Long, John Wesley, M.D. Emeritus Professor of Gynecology and Pediatrics in the Medical College of Virginia; formerly Gynecologist to the Old Dominion Hospital and the Richmond City Dispensary; Member, ex-Orator, and ex-Vice-President of the North Carolina Medical Society. *Vice-President*, 1902. *President.* Greensboro, N. C.

1904.—Lupton, Frank A., M.D. 716 North Eighteenth Street, Birmingham, Ala.

1902.—McAdory, Wellington P., M.D. Surgeon to Hillman Hospital. Birmingham, Ala.

1895.—McGannon, M. C., M.D. Professor of Surgery and Clinical Surgery, Medical Department, Vanderbilt University; Chief Surgeon. Woman's Hospital. 118 Eighth Avenue, N., Nashville, Tenn.

1911.—McGlannan, Alexius, M.D. Associate Professor of Surgery, College of Physicians and Surgeons, Baltimore. 114 West Franklin St., Baltimore, Md.

1893.—McGuire, Stuart, M.D. Professor of the Principles of Surgery and Clinical Surgery, University College of Medicine; Surgeon-in-Charge, St. Luke's Hospital; Visiting Surgeon, Virginia Hospital; Consulting Surgeon, Virginia Home for Incurables. *Vice-President*, 1906; *Treasurer*, 1908; *President*, 1909. 518 East Grace Street, Richmond Va.

1891.—McGuire, W. Edward, M.D. Professor of Gynecology, University College of Medicine; Gynecologist to the Virginia Hospital. 411 East Grace Street, Richmond, Va.

1905.—MacLean, Henry Stuart, M.D. Professor of Pathology, University College of Medicine. 406 West Grace Street, Richmond, Va.

1888.—McMurtry, Lewis S., M.D. Ex-President of the American Medical Association; Professor of Abdominal Surgery and Gynecology in the Medical Department of the Uni-

versity of Louisville; Surgeon to the Louisville City Hospital; Gynecologist to St. Mary and St. Elizabeth Hospital; Gynecologist to Gray Street Infirmary; ex-President of the American Association of Obstetricians and Gynecologists; ex-President of the Kentucky State Medical Society; Corresponding Member of the Gynecological Society of Boston; Fellow of the British Gynecological Society; Ordinary Fellow of the Edinburgh Obstetrical Society; Fellow of the American Surgical Society. *President*, 1891. Atherton Building, Fourth and Chestnut Streets, Louisville, Ky.

1888.—McRae, Floyd Wilcox, M.D. Professor of Gastro-intestinal, Rectal, and Clinical Surgery, Atlanta College of Physicians and Surgeons; Surgeon to Grady Hospital; ex-President Medical Association of Georgia; ex-Secretary of Section on Surgery and Anatomy, American Medical Association. *Vice-President*, 1897; *Treasurer*, 1901–1903; *President*, 1904. Peters Building, Atlanta, Ga.

1912.—Malone, Battle, M.D. 1701 Exchange Building, Memphis, Tenn.

1891.—Marcy, Henry Orlando, M.D., LL.D. Ex-President of the American Medical Association; President of the Section of Gynecology, Ninth International Medical Congress; late President of the American Academy of Medicine; Corresponding Member of the Medico-Chirurgical Society of Bologna, Italy; Fellow of the American Association of Obstetricians and Gynecologists. 180 Commonwealth Avenue, Boston, Mass.

1899.—Martin, E. Denegre, M.D. Professor of Surgery, Post-graduate Department, Tulane Medical College; Visiting Surgeon to Charity Hospital. *Vice-President*, 1906. 741 Carondelet St., New Orleans, La.

1909.—Martin, Frank, M.D. Clinical Professor of Surgery at the University of Maryland. 1000 Cathedral Street, Baltimore, Md.

1913.—Martin, Franklin H., M.D. Professor of Gynecology, Post-graduate School; Consulting Staff, St. Luke's Hospital. Editor, Surgery, Gynecology, and Obstetrics. 30 North Michigan Avenue, Chicago, Ill.

1904.—Mason, J. M., M.D. Gynecologist to St. Vincent Hospital. 1915 Sixteenth Avenue, S., Birmingham, Ala.

1899.—Mastin, William M., M.D. Fellow of the American Surgical Association; Member of the American Asso-

ciation of Genito-urinary Surgeons; Surgeon to the Mobile City Hospital. Joachim and Conti Streets, Mobile, Ala.

1893.—Matas, R., M.D. Professor of Surgery, Medical Department of Tulane University; Fellow of the American Surgical Association. *President*, 1911. 3523 Prytania St., New Orleans, La.

1896.—Matthews, William P., M.D. Professor of Anatomy, Medical College of Virginia; Orthopedic Surgeon to the Old Dominion Hospital. Richmond, Va.

1902.—Mayo, Charles H., M.D. Attending Surgeon, St. Mary's Hospital; Fellow American Surgical Society; ex-President, Western Surgical and Gynecological Association and of Minnesota State Medical Society. Rochester, Minn.

1899.—Michinard, P. E., M.D. 624 Gravier Street, New Orleans, La.

1888.—Miller, C. Jeff., M.D. Visiting Surgeon to Charity Hospital of Louisiana; Professor of Clinical Obstetrics and Clinical Gynecology in the Tulane University of Louisiana; Chief of the Division of Obstetrics, Gynecology and Abdominal Surgery of the Presbyterian Hospital. 1638 Joseph Street, New Orleans, La.

1907.—Mitchell, James F., M.D. Surgeon to Providence Hospital. *Vice-President.* 1344 Nineteenth Street, Washington, D. C.

1901.—Mixter, Samuel Jason, M.D. Surgeon, Massachusetts General Hospital; Consulting Surgeon, Massachusetts Charity Eye and Ear Infirmary; Instructor of Surgery, Harvard Medical School. 180 Marlborough St., Boston, Mass.

1910.—Moore, James E., M.D. Professor, and Chief of the Department of Surgery in the College of Medicine and Surgery of the University of Minnesota; Fellow and Ex-Vice-President of the American Surgical Association; Member and Ex-President of the Western Surgical Association; Member and Ex-chairman of the Surgical Section of the American Medical Association; Honorary member of the American Orthopedic Association. 212 Millard Hall, University of Minneapolis, Minneapolis, Minn.

1911.—Moore, John Thomas, M.D. Kress Medical Bldg., Houston, Texas.

1904.—Moran, John F., M.D. Professor of Obstetrics, Georgetown University; Obstetrician to Georgetown Uni-

versity Hospital and Columbia Hospital for Women. 2426 Pennsylvania Avenue, Washington, D. C.

1902.—Morris, Lewis C., M.D. Professor of Anatomy and Associate Professor of Gynecology, Birmingham Medical College; Councillor of Medical Association, State of Alabama; Vice-President of Tri-State Medical Society of Alabama, Georgia, and Tennessee. *Vice-President,* 1910. 716 North Eighteenth Street, Birmingham, Ala.

1900.—Morris, Robert Tuttle, M.D. Professor of Surgery, New York Post-Graduate Medical School and Hospital. 616 Madison Avenue, New York, N. Y.

1901.—Mullally, Lane, M.D. Professor of Obstetrics and Diseases of Children, Medical College, State of South Carolina; Visiting Physician in Obstetrics and Pediatrics, Roper Hospital. Charleston, S. C.

1894.—Murphy, J. B., M.D. Ex-President American Medical Association; Professor of Surgery, Northwestern University; Professor of Surgery, Post-Graduate School and Hospital; Attending Surgeon, Cook County and Mercy Hospitals. 2526 Calumet Avenue, Chicago, Ill.

1889.—Nicolson, William Perrin, M.D. Professor of Anatomy and Clinical Surgery, Atlanta College of Physicians and Surgeons; Visiting Surgeon to Grady Hospital; Senior Surgeon to Wesley Memorial Hospital; Senior Surgeon, St. Joseph Hospital. *Vice-President,* 1900. Prudential Building, Atlanta, Ga.

1890.—Noble, George H., M.D. Dean and Professor of Abdominal Surgery and Clinical Gynecology, Atlanta School of Medicine; Gynecologist of Grady Hospital; Senior Gynecologist, Wesleyan Memorial Hospital, Atlanta; Fellow of the American Gynecological Association and the American Association of Obstetricians and Gynecologists; ex-President of the Medical Association of Georgia; ex-Secretary of the Section of Obstetrics, American Medical Association. *Vice-President,* 1901; *President,* 1906. 131 South Pryor Street, Atlanta, Ga.

1911.—Norris, Henry, M.D. Rutherfordton, North Carolina.

1901.—Ochsner, A. J., M.D. Adjunct Professor of Clinical Surgery, College of Physicians and Surgeons; Surgeon-in-Chief, Augustana and St. Mary's Hospital. 2106 Sedgwick Street, Chicago, Ill.

1903.—Ochsner Edward H., M.D. Surgeon to Augustana and St. Mary's Hospital. 2106 Sedgwick Street, Chicago, Illinois.

1904.—Oechsner, John F., M.D. Professor of Orthopedic Surgery and the Surgery of Children, Post-Graduate Medical Department, Tulane University of Louisiana; Visiting Surgeon, Charity Hospital. Macheca Building, New Orleans, Louisiana.

1902.—Oliver, John Chadwick, M.D. Dean and Professor of Operative Surgery, Miami Medical College; Surgeon to the Cincinnati, Christ, and Presbyterian Hospitals. 628 Elm Street, Cincinnati, Ohio.

1888.—Parham, F. W., M.D. Professor of Surgery in the New Orleans Polyclinic. *Vice-President*, 1899; *President*, 1908. 1429 Seventh Street, New Orleans, La.

1910.—Payne, Robert Lee, Jr., M.D. Assistant Gynecologist to St. Vincent's Hospital; Surgeon to the Southern Railway; Consulting Surgeon to the Seaboard Air Line Railway. 300 Freemason St., Norfolk, Va.

1899.—Perkins, W. M., M.D. Chief of the Clinic Chair of General Clinical and Operative Surgery, New Orleans Polyclinic; Assistant Demonstrator of Operative Surgery, Medical Department, Tulane University of Louisiana; Visiting Surgeon to the Charity Hospital. 830 Canal Street, New Orleans, La.

1908.—Peterson, Reuben, A.M., M.D. Professor of Obstetrics and Gynecology, University of Michigan; Obstetrician and Gynecologist-in-Chief to the University of Michigan Hospital. Ann Arbor, Mich.

1899.—Platt, Walter Brewster, M.D. Surgeon to the Robert Garrett Hospital for Children. 802 Cathedral Street, Baltimore, Md.

1889.—Polk, William M., M.D. Dean and Professor of Obstetrics and Gynecology, Cornell University Medical College; Gynecologist to Bellevue Hospital; Consulting Surgeon to St. Luke's, St. Vincent's, New York Lying-in, and Trinity Hospitals; ex-President of American Gynecological Society, and New York Obstetrical Society. 310 Fifth Ave., New York.

1900.—Porter, Miles F., M.A., M.D. Surgeon to Hope Hospital; Professor of Surgery, Indiana University School of Medicine. 47 West Wayne Street, Fort Wayne, Ind.

1900.—Ransohoff, Joseph, M.D., F.R.C.S. Professor of Anatomy and Clinical Surgery, University of Cincinnati; Surgeon to Cincinnati, Good Samaritan, and Jewish Hospitals; Member American Surgical Association. 19 West Seventh Street, Cincinnati, Ohio.

1911.—Reder, Francis, M.D. Surgeon, St. Louis City and St. John's Hospitals and Missouri Sanatorium. Delmar Building, St. Louis, Mo.

1890.—Reed, Charles Alfred Lee, M.D. Ex-President of the American Medical Association; Professor of Gynecology and Abdominal Surgery in the Cincinnati College of Medicine and Surgery; Surgeon to the Cincinnati Free Hospital for Women; Fellow of the American Association of Obstetricians and Gynecologists; Fellow of the British Gynecological Society; ex-Chairman of the Section on Obstetrics and Diseases of Women of the American Medical Association; Secretary-General of the Pan-American Medical Congress, 1893; Honorary Member of the Medical Society of the State of New York. 19 W. Seventh Street, Cincinnati, Ohio.

1914.—Rhodes, Goodrich Barbour, A.B., M.D. Assistant Clinical Professor of Surgery, Ohio-Miami Medical College of the University of Cincinnati; Junior Attending Surgeon, Cincinnati and Good Samaritan Hospitals and Episcopal Hospital for Children. 4 West Seventh Street, Cincinnati, Ohio.

1912.—Richardson, Edward P., M.D. Surgeon to Outpatients, Massachusetts General Hospital, and Surgeon to the Robert B. Brigham Hospital for Chronic Diseases. 224 Beacon Street, Boston, Mass.

1888.—Roberts, William O., M.D. Professor of Principles of Surgery and Clinical Surgery, Medical Department of the University of Louisville; formerly Secretary of the Surgical Section of the American Medical Association. *President*, 1910; *Vice-President*, 1889. Atherton Building, Louisville, Ky.

1901.—Robins, Charles Russell, M.D. Professor of Gynecology, Medical College of Virginia; Gynecologist to the Memorial Hospital; Surgeon to the Atlantic Coast Railroad. 8 West Grace Street, Richmond, Va.

1906.—Rogers, Carey Pegram, M.D. Chief of Surgical Staff, St. Luke's Hospital; Consulting Surgeon, Sea Board Air Line Railway. 221 Laura Street, Jacksonville, Fla.

1901.—Rogers, Mack, M.D. Professor of Anatomy, Birmingham Medical College. 212 Twentieth Street, Birmingham, Ala.

1901.—Rosser, Charles M., M.D. Professor of Surgery, Baylor University, College of Medicine; Consulting Surgeon, Parkland Hospital; Attending Surgeon, Texas Baptist Memorial Sanitarium; ex-Vice-President Texas State Medical Association; Vice-President, Tri-State Society of Texas, Louisiana and Arkansas. *Treasurer*, 1904–07. 432 Gaston Avenue, Dallas, Texas.

1899.—Royster, Hubert Ashley, A.B., M.D. Surgeon to Rex Hospital; Surgeon-in-Chief, St. Agnes' Hospital; Surgeon to Southern Railway. *Vice-President*, 1907. 423 Fayetteville Street, Raleigh, N. C.

1909.—Ruffin, Kirkland, M.D. Surgeon-in-Charge of St. Christopher's Hospital. 218 York Street, Norfolk, Va.

1901.—Runyan, Joseph P., M.D. 203 West Second Street, Little Rock, Ark.

1908.—Russell, Wm. Wood, M.D. Associate Professor of Gynecology, Johns Hopkins University; Associate in Gynecology, Johns Hopkins Hospital; Gynecologist to Union Protestant Infirmary, Baltimore. 1208 Eutaw Place, Baltimore, Md.

1893.—Saunders, Bacon, M.D. Professor of Surgery and Clinical Surgery and Dean of Faculty of Medical Department, Fort Worth University; ex-President, Texas State Medical Association. *Vice-President*, 1903; *Member of Council*, 1908. Ninth and Houston Streets, Fort Worth, Texas.

1910.—Schachner, August, M.D. 844 Fourth Avenue, Louisville, Ky.

1907.—Scott, Arthur Carroll, M.D. Senior Surgeon, Temple Sanatorium. *Vice-President*, 1914. Temple, Texas.

1899.—Shands, A. R., M.D. Professor of Orthopedic Surgery in the Medical Department of the George Washington University and in the University of Vermont; Orthopedic Surgeon to the George Washington University Hospital, the Emergency Hospital, and Central Dispensary; Charter Member Washington Academy of Sciences; Member American Orthopedic Association; and Honorary Member of Medical Society of Virginia. 901 Sixteenth Street, N. W., Washington, D. C.

1914.—Shands, Harley R., A.A., M.D. Visiting Surgeon, Mississippi State Charity and Baptist Hospitals. Century Building, Jackson, Miss.

1902.—Sherrill, J. Garland, M.D. Professor of Surgery and Clinical Surgery, University of Louisville; Consulting Surgeon to Louisville Hospital. *Vice-President,* 1911. Atherton Building, Louisville, Ky.

1900.—Simpson, Frank Farrow, M.D. Assistant Gynecologist, Mercy Hospital; Gynecologist to Out-patient Department, Mercy Hospital. Jenkins Arcade Bldg., Pittsburgh, Pa.

1913.—Simpson, James Knox, M.D. Attending Gynecologist St. Luke's Hospital; Associate Gynecologist Duval County Hospital, Jacksonville, Fla.

1899.—Smythe, Frank David, M.D. Gynecologist to St. Joseph's and City Hospitals; Professor of Gynecology, Didactac and Clinical, in the Memphis Hospital Medical College; Ex-President West Tennessee Medical and Surgical Association; formerly Member of the Mississippi State Board of Health and State Board of Medical Examiners of Mississippi. Porter Building, Memphis, Tenn.

1904.—Stokes, James Ernest, M.D. Salisbury, N. C.

Founder.—Stone, Isaac Scott, M.D., Sc.D. Professor of Gynecology, Georgetown University; Gynecologist to Columbia and Georgetown University Hospitals; Fellow of the American Gynecological Society; Fellow of the Royal Society of Medicine, London, England. *Vice-President,* 1905. 1618 Rhode Island Avenue, N. W., Washington, D. C.

1894.—Talley, Dyer F., M.D. Associate Professor of Surgery, Birmingham Medical College; Attending Surgeon to Hillman Hospital; Surgeon to the Talley and McAdory Infirmary; Ex-President of the Jefferson County Medical Society; Member of the Southern Medical Association; Member of the Pan-American Medical Association; Member of the Alumni Association of the Charity Hospital of Louisiana; Member of the Board of Censors of the Jefferson County Medical Society; Member of the Alabama State Board of Censors, Committee of Public Health and Examiners; Fellow of the American Association of Obstetricians and Gynecologists. 1801 Seventh Avenue, Birmingham, Ala.

Founder.—Taylor, Hugh M., M.D. Professor of Practice of Surgery and Clinical Surgery, University College of Medicine; Surgeon to the Virginia Hospital; ex-President of the

Virginia Board of Medical Examiners. 6 North Fifth Street, Richmond, Va.

1898.—Taylor, William Wood, A.B., M.D. Gynecologist to the Lucy Brinkley and the Memphis City Hospitals. 206 Randolph Building, Memphis, Tenn.

1892.—Thompson, J. E., M.D. Professor of Surgery in the University of Texas. *Vice-President*, 1912. Galveston, Tex.

1908.—Torrance, Gaston, M.D. Member Surgical Staff Hillman's Hospital; also the Sisters' Hospital and St. Vincent's; Fellow of the American Association of Obstetricians and Gynecologists. 328 Woodward Building, Birmingham, Ala.

1909.—Trout, Hugh Henry, M.D. Surgeon-in-Chief of Jefferson Surgical Hospital, Roanoke, Va. 1303 Franklin Road, Roanoke, Va.

1888.—Tuholske, Herman, M.D. Professor of Surgery, Medical Department, Washington University; Consulting Surgeon, St. Louis City Hospital; Surgeon to St. Louis Polyclinic Hospital. 465 North Taylor Street, St. Louis, Missouri.

1912.—Turck, Raymond C., M.D. Consolidated Building, Jacksonville, Fla.

1905.—Vance, Ap Morgan, M.D. Surgeon to St. Mary and Elizabeth Hospital; Consulting Surgeon, Louisville City Hospital. *Vice-President*, 1913. 921 Fourth Street, Louisville, Ky.

1893.—Vander Veer, Albert, M.D. Professor of Clinical, Didactic, and Abdominal Surgery, Albany Medical College; ex-President of the American Surgical Association; ex-President of the American Association of Obstetricians and Gynecologists; ex-President of the Medical Society of the State of New York. 28 Eagle Street, Albany, New York.

1909.—Vaughan, George Tully, M.D. Professor of Surgery and Head of Department of Surgery in Georgetown University; Chief Surgeon in Georgetown University Hospital; Visiting Surgeon to the Emergency Hospital; Consulting Surgeon to the Government Hospital for the Insane. 1718 I Street, Washington, D.C.

1891.—Walker, Edwin, M.D., Ph.D. Gynecologist to the Evansville City Hospital; ex-President Mississippi Valley Medical Association; President of the Indiana State Medical Society; Fellow of the American Association of Obstetricians and Gynecologists. 712 Upper Fourth Street, Evansville, Ind.

1912.—Walker, George, M.D. Associate in Surgery, Johns Hopkins University. 1 E. Centre St., Baltimore, Maryland.

1911.—Waring, T. P., M.D. Savannah, Ga.

1905.—Wathen, John R., A B., M.D. Professor of Principles and Practice of Surgery and Clinical Surgery, University of Louisville; Surgeon to St. Anthony's, Louisville City, and University of Louisville Hospitals. 628 Fourth Avenue, Louisville, Ky.

1898.—Watkins, Isaac Lafayette, M.D. Ex-President of the Montgomery County Medical and Surgical Society. Montgomery, Ala.

1907.—Watts, Stephen H., M.D. Professor of Surgery University of Virginia; Surgeon-in-Chief and Director of the University of Virginia Hospital. University of Virginia, Charlottesville, Va.

1901.—Werder, X. O., M.D. Gynecologist, Mercy Hospital, Pittsburgh: Professor of Gynecology, West Pennsylvania Medical College; Consulting Surgeon to the South Side Hospital, Allegheny General Hospital, St. Francis' Hospital, etc. 524 Pennsylvania Avenue, Pittsburgh, Pa.

1888.—Westmoreland, Willis F., M.D. Professor of Surgery, Atlanta College of Physicians and Surgeons. *Vice President*, 1908. 241 Equitable Building, Atlanta, Ga.

1904.—Whaley, T. P., M.D. Lecturer on Genito-urinary and Renal Surgery, Charleston Medical School; Lecturer on Diseases of Skin, Medical College of State of South Carolina; Surgeon to Sherra's Dispensary; Visiting Surgeon, Charleston City Hospital. 13 Wentworth Street, Charleston, South Carolina.

1913.—Williams, Espy Milo, M.D. Surgeon, St. Mary's Hospital. Main Street, Patterson, La.

1900.—Williams, J. Whitridge, A.B., M.D. Professor of Obstetrics, Johns Hopkins University; Obstetrician-in-Chief, Johns Hopkins Hospital; Gynecologist to the Union Protestant Infirmary. 1128 Cathedral Street, Baltimore, Md.

1907.—Willis, A. Murat, M.D. Instructor in Abdominal Surgery, Medical College of Virginia; Junior Surgeon to Memorial Hospital, Richmond, Va. 405 East Grace Street, Richmond, Va.

1913.—Windell, James Tolbert, M.D. 715 West Jefferson Street, Louisville, Ky.

1905.—Winslow, Randolph, M.D., LL.D. Professor of Surgery, University of Maryland; Chief Surgeon, University Hospital; Consulting Surgeon, Hebrew Hospital, and to Hospital for Crippled Children. 1900 Mt. Royal Terrace, Baltimore, Md.

1905.—Witherspoon, T. Casey, M.D. Formerly Professor of Operative and Clinical Surgery, Medical Department, St. Louis University; Member of American Association of Anatomists. 307 West Granite Street, Butte, Mont.

1900.—Wysor, John C., M.D. Surgeon-in-Charge, Chesapeake and Ohio Hospital. Clifton Forge, Va.

1900.—Young, Hugh H., M.D. Chief of Clinic, Genito-urinary Surgery, Johns Hopkins Hospital. 330 North Charles Street, Baltimore, Md.

1902.—Zinke, E. Gustav, M.D. Professor of Obstetrics and Clinical Gynecology in the Ohio-Miami Medical College, the Medical Department of the Cincinnati University; Obstetrician and Gynecologist to German Protestant Hospital; Attending Obstetrician to Ohio Maternity; ex-President of American Association of Obstetricians and Gynecologists 4 West Seventh Street, Cincinnati, Ohio.

CONSTITUTION

ARTICLE I

The name of this Association shall be THE SOUTHERN SURGICAL AND GYNECOLOGICAL ASSOCIATION.

ARTICLE II

The object of this Association is to further the study and practice of surgery and gynecology among the profession of the Southern States.

ARTICLE III

This Association shall adopt and conform to the Code of Ethics of the American Medical Association.

ARTICLE IV

SECTION 1. Any reputable physician who practises surgery or gynecology, and who is vouched for by two members of the Association and recommended by the Council, shall be eligible to membership in this body.

SEC. 2. The honorary members shall not exceed twenty-five in number, and shall enjoy all the privileges of other members, excepting to vote or hold office, but shall not be required to pay any fee.

ARTICLE V

SECTION 1. The officers of this Association shall be a President, two Vice-Presidents, a Secretary, a Treasurer, and a Council, elected by ballot.

SEC. 2. The President and Vice-Presidents shall be elected for one year, and the President shall not be eligible for reëlection at any time; the Secretary and Treasurer, each, for five years; and the Council as provided for in the By-laws.

ARTICLE VI

SECTION 1. It shall be the duty of the President to preside at all meetings of the Association; to give the casting vote; to see that the rules of order and decorum be properly enforced in all deliberations of the Association; to sign the approved proceedings of each meeting, and to approve such orders as may be drawn upon the Treasurer for expenditures ordered by the Association.

SEC. 2. In the absence of the President the first Vice-President shall preside, and in his absence the second Vice-President shall preside.

SEC. 3. In the absence of all three, the Association shall elect one of its members to preside *pro tem.*

SEC. 4. It shall be the duty of the Secretary to keep a true and correct record of the proceedings of the meetings; to preserve all books, papers, and articles belonging to the archives of the Association; to attest all orders drawn on the Treasurer for moneys appropriated by the Association; to keep the account of the Association with its members; to keep a register of the members, with the dates of their admission and places of residence. He shall collect all moneys due from the members and pay to the Treasurer, taking his receipt for the same. He shall report such unfinished business of previous meetings as may appear on his books requiring action, and attend to such other business as the Association may direct. He shall also supervise and conduct all the correspondence of the Association, and edit the TRANSACTIONS under the direction of the Council.

SEC. 5. It shall be the duty of the Treasurer to keep a correct record of all moneys received from the hands of the Secretary, giving his receipt for the same; pay them out by order of the Association as indorsed by the President and attested by the seal in the hands of the Secretary.

SEC. 6. It shall be the duty of the President of the Association to appoint an Auditing Committee, consisting of three members of the Association, whose duty it shall be to examine the books of the Secretary and Treasurer, and report on the same on the last day of the session.

ARTICLE VII

Vacancies occurring in the offices of the Association shall be filled by appointment of the President until the next meeting. He shall also have the appointment of all committees not otherwise provided for.

ARTICLE VIII

This Constitution shall take effect immediately from the time of its adoption, and shall not be amended except by a written resolution, which shall lie over one year, and receive a vote of two-thirds of the members present.

ARTICLE IX

The membership of the Association shall be limited to two hundred.

BY-LAWS

ARTICLE I

The Southern Surgical and Gynecological Association shall meet annually on the Tuesday of the week preceding the week in which Christmas occurs, at 10 A.M., at such place as may be designated at the preceding meeting.

ARTICLE II

The members present shall constitute a quorum for business.

ARTICLE III

The annual dues of each member shall be $10, paid in advance.

ARTICLE IV

The usual parliamentary rules governing deliberative bodies shall govern the business workings of this Association.

ARTICLE V

All questions before the Association shall be determined by a majority of the votes present.

ARTICLE VI

The President shall deliver an annual address at each meeting of the Association.

ARTICLE VII

The Secretary of the Association shall receive at each annual Session a draft from the President, drawn on the Treasurer, for the sum of $500, for services rendered the Association, and to this shall be added the necessary expense incurred in the discharge of his official duties.

ARTICLE VIII

It shall be the duty of the Secretary, one month prior to the annual meeting, to notify the members of the Association and urge their attendance.

ARTICLE IX

The authors of papers shall notify the Secretary, six weeks prior to the meeting, of the titles of their essays, so that they may be incorporated in the preliminary programme.

ARTICLE X

COUNCIL

The Council shall consist of five members; and of those elected at the primary meeting, the first shall serve five years, the second four, the third three, the fourth two, and the fifth one year; so that subsequently one member of the Council shall be elected annually to serve five years. No member of the Council shall be eligible for reëlection. The President and Secretary shall be *ex-officio* members of the Council.

This Council shall organize by electing a Chairman and Secretary, and shall keep a record of its proceedings.

The duties of this Council shall be—

1. To investigate applications for membership and report to the Association the names of such persons as are deemed worthy.

2. To take cognizance of all questions of an ethical, judicial, or personal nature, and upon these the decision of the Council shall be final; *provided*, that appeal may be taken from such decision of the Council to the Association, under a written protest, which protest shall be sustained by the Association, and the matter shall then be referred to a special committee, with power to take final action.

3. All motions and resolutions before the Association shall be referred to the Council without debate, and it shall report by recommendation at as early an hour as possible.

ARTICLE XI

The President shall appoint at each annual meeting a Committee of Arrangements.

ARTICLE XII

The Council shall have full power to omit from the published TRANSACTIONS, in part or in whole, any paper that may be referred to it by the Association, unless specially instructed to the contrary by the Association, which will be determined by vote.

ARTICLE XIII

Any member failing to pay his dues for more than one year shall be dropped.

ARTICLE XIV

No paper shall be read before this Association which does not deal strictly with a subject of surgical or gynecological importance.

ARTICLE XV

No paper read before this Association shall be published in any medical journal or pamphlet for circulation, as having been read before the Association, without having received the indorsement of the Council.

ARTICLE XVI

The reading of papers shall be limited to twenty minutes each, except by permission of the Association.

MINUTES OF THE PROCEEDINGS

AT THE

TWENTY-SEVENTH ANNUAL MEETING

OF

THE SOUTHERN SURGICAL AND GYNECOLOGICAL ASSOCIATION

HELD AT THE

GROVE PARK INN

Asheville, N. C.

DECEMBER 15, 16, AND 17, 1914

TWENTY-SEVENTH ANNUAL MEETING

First Day.—*Tuesday, December* 15, 1914.

The following named members were present:

Abell, Irvin
Allen, Carroll W.
Barr, Richard A.
Bloodgood, Joseph E.
Boldt, Herman J.
Brown, John Young
Buist, A. Johnson
Burch, Lucius E.
Byford, Henry T.
Caldwell, C. E.
Caldwell, Robert
Cannaday, John E.
Carr, William P.
Cathcart, R. S.
Clark, S. M. D.
Coley, William B.
Crile, George W.
Cullen, Thomas S.
Danna, James A.
Davis, John D. S.
Davis, John Staige
Doughty, W. H.
Elbrecht, O. H.
Fort, Rufus E.
Frank, Louis
Gibbon, R. L.
Goldsmith, W. S.
Guerry, Le Grand
Haggard, William D.
Hagner, Francis R.
Hanes, Granville S.
Hill, Robert S.
Hodgson, Fred G.
Horsley, J. Shelton
Hunner, Guy LeRoy
Irvin, James S.
Jackson, William R.
Johnston, George Ben
Johnson, Joseph Taber
Jones, Edward G.
Judd, Edward S.
Kelly, Howard A.
Kohlman, William
La Roque, G. Paul
Lewis, Bransford
Lloyd, Samuel
Long, John Wesley
McAdory, Wellington P.
McGannon, M. C.
McGlannan, Alexius
McGuire, Stuart
MacLean, Henry Stuart
McMurtry, Lewis S.
Malone, Battle
Marcy, Henry O.
Mason, J. M.
Matas, Rudolph
Mayo, Charles H.
Mixter, Samuel J.
Oliver, John C.

Payne, Robert Lee, Jr.,
Peterson, Reuben
Ransohoff, Joseph
Reder, Francis
Reed, Charles A. L.
Richardson, Edward P.
Rogers, Cary P.
Royster, Hubert A.
Ruffin, Kirkland
Saunders, Bacon
Scott, Arthur A.
Sherrill, J. Garland
Stokes, James Ernest
Thompson, J. E.
Trout, Hugh H.
Watts, Stephen H.
Windell, J. T.
Winslow, Randolph
Total, 78

Letters of regret and telegrams were received from members who were unable to be present.

Morning Session. The Association met at 9.30 a.m., at the Grove Park Inn, and was called to order by Dr. Hubert A. Royster, Chairman of the Committee of Arrangements, who said:

It is with a peculiar sense of pleasure that the North Carolina Committee of Arrangements greet you today. For the first time in the history of the Association, we meet within the borders of the Old North State. And more especially we wish to emphasize the fact that for the first time in its history the Association has a presiding officer from North Carolina, one of the founders of the Association, and the second time in its history when a president from his own State presided. I need not make any further remarks other than to say that we heartily welcome you, and we hope you will enjoy your stay both professionally and personally.

The first announcement I have to make is in regard to entertainments. You will notice on the first page of the program that the initial event is a tea for the ladies, given by the management of the Grove Park Inn this afternoon. The hour has been changed from five to six. It is requested that the gentlemen join the ladies as soon as the session of the Association is over and before the tea is completed, if possible.

Tonight (Tuesday) a dinner will be given in the hotel, and to this are invited the members, their ladies, and guests. This dinner will simply be the regular hotel dinner, but served in a more elaborate form in the nature of a banquet. It will mark the occasion of the President's Address, and we hope in that informal way to add to the pleasure of those in listening to the address, and making us feel more sociable and more at home. Any member of the Association, or any guest of the

hotel, will have the privilege of inviting any guest in the city or one who accompanies them upon registering them as individual guests. The management would like those who are going to extend such invitations to do so at as early a date as possible to provide places for them.

Tomorrow afternoon (Wednesday) we hope to be able to take a drive through the Biltmore estate. We have planned to devote the whole afternoon to it, so that the Association will hold a meeting Wednesday evening instead of in the afternoon.

I wish now to present, not to introduce, the President of the Association, who will now take charge of the meeting. Dr. Long needs no praise from me or from any member of the Association. He is one of the six surviving founders, and if there is anyone who knows the history and purposes of this organization, as he will tell you this evening, he certainly does. I take great pleasure in presenting to you the President, Dr. Long, who will now call the meeting to order and officially preside.

President Long then took the Chair and called for the reading of the first paper.

1. "Sarcoma of the Undescended Testis, with Report of Twelve Cases," by Dr. W. B. Coley, New York City.

Discussed by Drs. Jackson, Lewis, Malone, Ransohoff, and in closing, by the essayist.

2. "The Simplicity and Efficacy of Blood Transfusion, with Kimpton-Brown Tube," which was illustrated by lantern slides, by Dr. J. M. Mason, Birmingham, Alabama.

3. (*a*) "A New Method of Lateral Anastomosis of Blood-vessels and an Operation for the Cure of Arterio-Venous Aneurysm; (*b*) Transplantation of the Anterior Temporal Artery," illustrated by lantern slides, by Dr. J. Shelton Horsley, Richmond, Virginia.

These papers were discussed together by Drs. Richardson, Davis, Jackson, Elbrecht, Mayo, and the discussion closed by the essayists.

The Secretary presented the following list of visiting surgeons and moved that they be extended the privileges of the floor and be invited to participate in the discussions, which motion was seconded and carried.

Drs. W. L. Cousins, Portland, Maine; W. J. Mixter, Boston; John A. Williams, Greensboro, North Carolina; E. R. Mich-

eaux, Greensboro, North Carolina; J. H. Boyles, Greensboro, North Carolina; H. S. Plummer, Rochester, Minnesota; M. H. Fletcher, Asheville, N. C.; J. B. Haskins, Chattanooga, Tenn.; Goodrich B. Rhodes, Cincinnati, Ohio; Dr. Woolford, Chattanooga, Tennessee; Dr. T. B. Johnson, Beverly, Massachusetts; Dr. Primrose, Newbern, North Carolina; Gordon K. Dickinson, Jersey City, New Jersey; Webb Griffith, Asheville, North Carolina; Dr. Reeves, Asheville, North Carolina; T. B. Johnson, Frederick, Maryland.

4. "Surgical Treatment of Fractures," by Dr. W. R. Jackson, Mobile, Alabama.

5. "Modification of Lane's Bone Plates," by Dr. H. Stuart MacLean, Richmond, Virginia.

These two papers were discussed together by Drs. Marcy, Winslow, Mason, Trout, Coley, Haggard, Elbrecht, Malone, and in closing by the authors of the papers.

6. "Ligature of the Innominate Artery," by Dr. James E. Thompson, Galveston, Texas.

Discussed by Drs. Bloodgood, Sherrill, Horsley, Coley, and discussion closed by the essayist.

On motion, the Association adjourned until 2 P.M.

Afternoon Session. The Association reassembled at 2 P.M., and was called to order by the President.

7. "The Surgical Service of the Civil War," by Dr. Henry O. Marcy, Boston Massachusetts.

8. "What the Civil Surgeon can do for Military Surgery in Time of Peace," by Dr. Joseph G. Bloodgood, Baltimore, Maryland.

9. "Military Surgery, with Special Consideration of Gunshot Injuries," by Colonel Charles Richard, U. S. A., Washington, D. C., by invitation.

These three papers were discussed jointly by Drs. Cullen, Brown, Caldwell, Marcy, and the discussion closed by Drs. Bloodgood and Richard.

10. "Uterine Prolapse," by Dr. Charles H. Mayo, Rochester, Minnesota.

Discussed by Drs. Byford, Hill, Boldt, Reed, Carr, Kelly, and in closing by the essayist.

11. "Some Points in the Treatment of Intestinal Obstruction," by Dr. Samuel J. Mixter, Boston.

Discussed by Drs. Horsley, Sherrill, Coley, Reder, McGlannan, and the discussion closed by the essayist.

12. "Cancer of the Prostate," by Dr. E. S. Judd, Rochester, Minnesota.

13. "Prostatectomy Under Local Anesthesia," by Dr. Carroll W. Allen, New Orleans.

These two papers were discussed together by Drs. Hagner, Lewis, and discussion closed by the authors of the papers.

14. "Solid Fibroid Tumor of the Ovary," by Dr. Joseph Taber Johnson, Washington, D. C.

15. "Further Experience in the Treatment of Fibroid Tumors with Radium," by Dr. Howard A. Kelley, Baltimore.

These two papers were discussed together by Drs. Cullen, Peterson, Hill, Boldt, Ransohoff, Carr, MacCarty, Byford, Mayo, and the discussion closed by the essayists.

On motion, the Association adjourned until 9 A.M. Wednesday.

At the banquet, President Long delivered his address. He selected for his subject "The Wisdom of the Past, a Prophecy of the Future."

SECOND DAY.—*Wednesday, December* 16, 1914.

Morning Session. The Association met at 9 A.M., and was called to order by the President.

16. "A Rare Type of Bladder Ulcer in Women; Reports of Cases," by Dr. Guy LeRoy Hunner, Baltimore.

Discussed by Drs. Kelly, Cullen, Lewis, and in closing by the essayist.

17. "Review of Cases of Perinephritic Abscess Operated on at the Massachusetts General Hospital, with End Results," by Dr. E. P. Richardson, Boston.

Discussed by Drs. Cullen, Hagner, Mason, Carr, Ruffin, and in closing by the essayist.

18. "Further Study of Renal Calculus with Especial Reference to Anuria Due to Unilateral Obstruction," by Dr. Louis Frank, Louisville, Kentucky.

19. "Ureter Stones; The Technique of their Removal by Cystoscopic Methods, with Report of Cases, Illustrated," by Dr. Bransford Lewis, St. Louis, Missouri.

These two papers were discussed together by Drs. Hunner, Hagner, Sherrill, and the discussion closed by the essayists.

20. "Hair Balls in the Gastro-intestinal Tract," by Dr. Rudolph Matas, New Orleans.

21. "Hemangio-Endothelio-Blastoma of the Stomach," by Dr. J. Garland Sherrill and Dr. F. S. Graves, Louisville, Kentucky.

22. "Surgical Treatment of Perforating Duodenal Ulcer," by Dr. John Young Brown, St. Louis, Missouri.

The three papers were discussed together by Drs. Mixter, Reder, Marcy, Mayo, Oliver, Cullen, Guerry, and Carr.

On motion, the Association adjourned until 8 P.M.

NOTE.—There was no afternoon session. The members and guests took a drive through the Biltmore estate.

Evening Session. The Association reassembled at 8 P.M., and was called to order by the President.

23. "Thoracotomy in Unresolved Pneumonia," by Dr. Randolph Winslow, Baltimore.

Discussed by Drs. Marcy Carr, and in closing by the essayist.

24. "Massive Umbilical and Ventral Hernias," by Dr. Alexius McGlannan, Baltimore.

25. (*a*) "A Calcified Lymph Gland Producing Symptoms Somewhat Suggestive of Gall-stones. (*b*) An Old Infected Abdominal Pregnancy with an Extension of the Long Bones into the Bladder and Bowel. (*c*) Removal of a Large Tuberculous Cyst of the Mesentery of the Jejunum, together with a Corresponding Segment of the Bowel; Recovery; Later Death Apparently from Tubercular Meningitis. (*d*) Operation for Radical Cure of Umbilical Hernia in a Patient Weighing Four Hundred and Sixty-four Pounds. (*e*) A Further Case of Adenomyoma of the Recto-Vaginal Septum," by Dr. Thomas S. Cullen, Baltimore.

26. "Diaphragmatic Hernia; Report of Four Cases," by Dr. John D. S. Davis, Birmingham, Alabama.

These papers were discussed together by Drs. McGuire, Clark, Dickinson, Marcy, Carr, Kelly, Horsley, and the discussion was closed by Drs. McGlannan and Cullen.

27. "(*a*) The Kinetic Theory of Peritonitis; (*b*) Acidity, Alkalescence and Anesthesia," by Dr. George W. Crile, Cleveland, Ohio.

Discussed by Drs. Sherrill, Thompson, Barr, Carr, Danna, Jackson, Hill, and in closing by the essayist.

28. "Gall-stones During the Course of 1066 Abdominal Sections for Pelvic Disease," by Dr. Reuben Peterson, Ann Arbor, Michigan.

Discussed by Drs. Kelly, Marcy, Dickinson, Mayo, and the discussion closed by the essayist.

29. "A Contribution to the Cure of Cancer of the Uterus by Curetting for Diagnosis," by Dr. Herman J. Boldt, New York.

30. "New Facts about Cancer and Their Clinical Significance" (by invitation), by Dr. William Carpenter MacCarty, Rochester, Minnesota.

31. "Preliminary Report on the Use of the Percy Cautery in Uterine Carcinoma, with Special Reference as a Preliminary Measure to Wertheim's Operation," by Dr. S. M. D. Clark, New Orleans.

These three papers were discussed jointly by Drs. Scott, Horsley, Crile, Peterson, and the discussion closed by the essayists.

On motion, the Association adjourned until 9 A.M. Thursday.

THIRD DAY.—*Thursday, December* 17, 1914.

Morning Session. The Association met at 9 A.M., and was called to order by the President.

32. "Case of Mega-Colon," by Dr. Irvin Abell, Louisville, Kentucky.

Discussed by Drs. Winslow, Kelly, Crile, and in closing by the author of the paper.

33. "Spina Bifida; Tibial Transplant from Father to Child," Dr. Hugh H. Trout, Roanoke, Virginia.

Discussed by Drs. Crile, Winslow, and in closing by the essayist.

34. "Trauma in and About Joints," by Dr. C. E. Caldwell, Cincinnati, Ohio.

Discussed by Drs. Mixter, Reder, Thompson, Davis, Jackson, Winslow, Rhodes, Crile, Trout, and discussion closed by the essayist.

35. "Bulgaria Bacilli in the Treatment of Alkaline Cystitis," by Dr. Francis R. Hagner, Washington, D. C.

Discussed by Drs. Lewis, Dickinson, Hunner, and in closing by the essayist.

Report of Auditing Committee. Dr. J. Garland Sherrill, Louisville, reported that the Auditing Committee had carefully examined the books and vouchers of the Secretary and Treasurer and had found them correct, with a cash balance of $1010.94.

(Signed) J. GARLAND SHERRILL,
STEPHEN H. WATTS,
R. S. CATHCART.

THE PRESIDENT.—What will you do with the report of the Auditing Committee?

DR. RANDOLPH WINSLOW.—I move that it be accepted. Seconded and carried.

THE PRESIDENT.—We will now have the report of the Council, which will be read by the Secretary.

The Secretary read the report of the Council, as follows:

1. The Council suggests that the recommendations in the admirable address of the President be drafted into suitable amendments to the Constitution for action at the next meeting.

2. The Council recommends that the resignations of Drs. J. M. Baldy, M. W. O'Brien, and A. B. Cooke be accepted.

3. That the deaths of our Fellows, Drs. Roswell Park, W. L. Robinson, and G. E. Garvin be recorded in the TRANSACTIONS.

4. That Dr. Joseph Taber Johnson and Dr. Nicholas Schilling be transferred to Honorary Fellowship.

5. That the following applicants be elected to Fellowship to fill the seven vacancies:

Dr. Harley R. Shands, Jackson, Mississippi; Dr. Lucian H. Landry, New Orleans, Louisiana; Dr. Fred Warren Bailey, St. Louis, Missouri; Dr. Goodrich B. Rhodes, Cincinnati, Ohio; Dr. William Lewis Cousins, Portland, Maine; Dr. Dean Lewis, Chicago, Illinois; Dr. William A. Downes, New York City.

6. The Council suggests that a telegram of best wishes for a speedy recovery be sent to Dr. W. B. Dorsett, of St. Louis, Missouri.

The following names are suggested as nominations for the three members to which the Society is entitled, in common with fourteen other societies, to constitute the 150 Board of Governors of the American College of Surgeons: Dr. R. E. Fort, Dr. Guy L. Hunner, Dr. Louis Frank.

Cincinnati, Ohio, is recommended as the next place of meeting, and that Dr. Charles A. L. Reed be requested to act as Chairman of the Committee of Arrangements.

It is suggested to the resident fellows that one of the sessions be devoted to clinical work in the new Cincinnati Hospital, if convenient.

The vacancy on the Council occurring from the expiration of service of Dr. W. O. Roberts be filled by the retiring President, Dr. John Wesley Long.

The following officers are nominated for the ensuing year: *President*, Dr. Bacon Saunders, Fort Worth, Texas; *Vice-Presidents*, Dr. Thomas S. Cullen, Baltimore, and Dr. S. M. D. Clark, New Orleans.

Respectfully submitted,

STUART MCGUIRE,
JOHN YOUNG BROWN,
JOSEPH TABER JOHNSON,
L. S. MCMURTRY,
HOWARD A. KELLY,
JOHN W. LONG.

THE PRESIDENT.—What disposition do you wish to make of the report of the Council?

DR. J. GARLAND SHERRILL.—I move that the report be adopted.

Seconded by several and carried unanimously.

DR SHERRILL.—In view of the fact that we have but a few members in North Carolina, and that the Chairman of the Committee of Arrangements has entertained us most beautifully, and has spent considerable time in giving attention to the details of preparation for our entertainment, and that the services of the hotel have been extended to us very courteously, I think it is but right we should pass a resolution thanking Dr. Royster for his efforts and the hotel management for their courtesies that have been extended to us. I therefore offer that as a motion which, I trust, will meet with the approval of the Association.

Motion seconded and carried unanimously.

THE PRESIDENT.—The Chair happens to know that Dr. Royster did more than anyone else for the success of this meeting, and he deserves all the praise and expressions of appreciation that the Association can give him.

It is now my pleasure to appoint a committee to conduct the newly-elected President to the Chair. Before doing so, I desire to express my profound appreciation not only of the honor which this Association conferred upon me, but of the very great courtesy which you have shown me while presiding over your deliberations. What you have done for me is the greatest thing that has ever happened to me in a professional way.

I will appoint Dr. George Ben Johnston and Dr. Samuel J. Mixter to escort the President-elect to the Chair. (Applause.)

In introducing his successor, Dr. Long said:

Dr. Bacon Saunders, I assure you that in resigning this position and this historic gavel into your hands, it gives me pleasure to leave them with a man whose fellowship in this Association has been signalized by the most loyal devotion, as shown by your constant attendance, your unremitting interest and efforts in the success of this Association; a man whose reputation is not bounded even by the wide borders of the Lone Star State, but whose name is known wherever southern surgery is discussed. It is my pleasure to resign to you this gavel. (Applause.)

Dr. Saunders, in accepting the presidency, said:

Gentlemen of the Association: It is said on one occasion Mark Twain visited the President of the United States. Mark, you know, was not very loquacious, and this particular president was not very loquacious. When Mark was presented nothing was said for a few seconds, so Mark said, "Mr. President, I am embarrassed, are'nt you?" (Laughter.) I am truly embarrassed, gentlemen, on this occasion by your kindness, your partiality, and what I know will be your indulgence. It had never occurred to me that I should meet, certainly in this life, with such an overwhelming honor as has been conferred upon me today. I would have been happy and extremely content in the future, as in the past, to come to these annual sessions and sit at the feet of these professional Gamaliels, but since you in your wisdom have decreed otherwise, I accept the decree. So I say to you now gentlemen, whatever I have of ability; whatever I have of energy; whatever I have of fidelity is yours to command. May Providence enable us all to meet at Cincinnati in December of 1915. (Applause.)

36. "Some Results of Orthopedic Surgery, Illustrated by Moving Pictures and Lantern Slides," by Dr. Fred G. Hodgson, Atlanta, Georgia.

Discussed by Dr. Caldwell and in closing by the essayist.

37. "The Treatment of Angiomata by the Injection of Boiling Water (Wyeth Method)," by Dr. Francis Reder, St. Louis Missouri.

Discussed by Drs. Hill, Boldt, Mayo, Hodgson, Jackson, and the discussion closed by the essayist.

38. "A Report of Three Cases of Cysts of the Mesentery," by Dr. Edward E. Jones, Atlanta, Georgia.

39. "The Use of Skin Grafts in the Ambulatory Treatment of Ulcers," by Dr. John Staige Davis, Baltimore.

40. "Spontaneous Rupture of the Tubercular Spleen; Report of Case," by Dr. John E. Cannaday, Charleston, West Virginia.

These three papers were discussed together by Drs. Winslow, McGlannan, Watts, and in closing by Dr. Jones.

THE SECRETARY.—It may interest the Fellows to know that there have been forty papers read at this meeting out of fifty listed, not including the President's Address. This is a remarkable showing. Moreover, there have been seventy-nine men in attendance upon the meeting. This has been one of the most delightful, satisfactory and scientific meetings we have ever had.

On motion of Dr. John D. S. Davis, the Association then adjourned to meet in Cincinnati, Ohio, in December, 1915.

W. D. HAGGARD,
Secretary.

ADDRESS OF THE PRESIDENT

THE WISDOM OF THE PAST, A PROPHECY OF THE FUTURE

By John Wesley Long, M.D., F.A.C.S.
Greensboro, North Carolina

The coming of the Southern Surgical and Gynecological Association into the old North State marks an epoch in the history of both State and Association. For the State I will say we appreciate your coming into our midst. With the exception of the Charleston meeting, twenty years ago, when the lamented Cornelius Kollock was president, this is the only time the Association has ever gone to the State from which it chose its presiding officer. Therefore I may add a personal note of gratification.

Your well-nourished features and elegant apparel do not indicate that you have been feeding upon husks; nevertheless we have killed the fatted calf and brought forth the wedding robe and ring, indicating thereby that, having come once, we shall always claim you as our own, and want you to feel that we are yours.

This meeting shall, we trust, not soon be forgotten by the Association. Be it known unto you, friends, that you stand upon soil made sacred by every token that appeals to one's patriotism, love of home, and native land. For instance, to have been one of the original thirteen colonies is no mean distinction. Without invidious comparison, suppose one could have the choice as to where he should be born, do you imagine he would hesitate for a moment to choose a State

whose sons unsheathed the sword to gain their independence, who defied royal tryanny, even though it be called "treason," rather than a State, however great, whose star has been added to Old Glory, like a belated afterthought?

Glancing back as far as the Revolution, we find a number of important engagements were fought in North Carolina; and the decisive blow that sent Lord Cornwallis reeling on to Yorktown, where he surrendered to Washington, was struck by General Nathaniel Greene at the battle of Guilford Court House, near the centre of the State.

Passing rapidly to the period of our Civil War, which some of you remember and a few saw service in, if you will pardon a personal reference, I may say that I was born amidst the mutterings of the ominous war-cloud which burst into that most fearful internecine conflict the world had ever seen. Into that halocaust North Carolina sent more men and boys, than she had voters, over forty thousand of whom never came back. Notwithstanding the gruesome price she paid, it shall ever be the proud boast of the old North State that "she was first at Bethel, farthest at Gettysburg and last at Appomattox." Into the history of her soldier heroes the State has written the legend inscribed upon the stones over the Spartan dead who died at Thermopolæ: "Stranger, go tell in Lacedæmon that we lie here in obedience to her command."

But it is not of deeds of valor or exploits of war that North Carolina would boast. Rather would she be known for her victories of peace. In common with the other southern States, the war left her impoverished beyond description, robbed of civil liberty, her property confiscated, her fair land despoiled, her slaves sitting in legislative halls. Surely she was cast down, but not destroyed. Then it was her valiant sons arose in their might and disfranchised the ignorant, the incompetent, the vicious, the impossibles, and reënfranchised the true citizenship of the state. This act has stood the test of the Supreme Court of the land.

While North Carolina is distinctive in many ways, she

is but a type of the South. Undisturbed to any great extent by the flotsam and jetsam of other lands, the South developed and retained customs, conditions, conventionalities, convictions, all her own. It would be interesting to study these characteristics, but it would lead us too far afield. We are concerned in this connection only with the southern surgeon.

Those of you who live in the large cities of the North and West cannot appreciate the disadvantages under which the southern surgeon labored. If this were true in antebellum days, it was a hundredfold more so following the war. Isolated, limited in clinical and laboratory facilities, practically denied membership in the national special societies, his mental development hindered because of lack of opportunity, the old time southern physician was thrown back upon his own resources. No one questions his native ability, environment constituted the shackles that clogged his feet. His was the task to overcome obstacles. Often he had to make brick without straw. But he remembered the axe over the old Norseman's door and the slogan to "find a way or make one." He made one, yea many, one of which leads to this glad hour and occasion; and in the making he laid the foundation so broad and deep that those who follow may find safe and easy footing.

Even a superficial knowledge of the southern surgeon convinces one that he possessed superb qualities, and his history is illuminated with evidences of his ability to do great things. Despite the limitations of environment, he encompassed herculean tasks. Many brilliant examples are well known where he burst the bonds that would have circumscribed a weaker man, performing exploits that make him the envy of the world. A perspective reveals him unearthing great discoveries, doing unprecedented operations, formulating undying principles, daring to do deeds of heroism!

However, let it be distinctly understood that we make no claim to superiority of either blood or brawn or brain. We would draw no disparaging distinctions. Rather do we rejoice with exceeding great joy in the ability and success of

every member of our profession under the Stars and Stripes, in fact throughout the world. But as a faithful messenger, as one who under the providence of God has been spared to tell the tale, I must give credit to my compatriots who deserve it; whose lives stand out as beacon lights along the pathway of history; whose works have mitigated pain, alleviated disease, and added years to the life of womankind, and that of man as well.

If we may judge by what they accomplished, many of these men were so far in advance of their times as to appear to have possessed the knowledge of prescience. As is well known, the gift of prescience was granted to the prophets of old, but in a material sense was by no means confined to them. One of the books that enthralled my boyhood days was Jules Verne's *Twenty Thousand Leagues Under the Sea*, written several years (1869) before Holland planned his first submarine (1875).

Sometimes the poet[1] gets a glimpse of the deeper things of life, his vivid imagination giving him visions denied ordinary mortals, enabling him to foretell that which later becomes clear to us all. The inimitable Shakespeare, eighty-three years (1602) before Newton announced the law of gravitation (1685), makes Cressida to say:

> But the strong base and building of my love
> Is as the very center of the earth,
> Drawing all things to it.

Listen to Tennyson in Locksley Hall, written in 1842:

> For I dipped into the future, far as human eye could see,
> Saw the Vision of the world, and all the wonder that would be;
> Saw the heavens fill with commerce, argosies of magic sails,
> Pilots of the purple twilight, dropping down with costly bales;
> Heard the heavens fill with shouting, and there rain'd a ghastly dew
> From the nations' airy navies grappling in the central blue;
> Far along the world-wide whisper of the south-wind rushing warm,
> With the standards of the peoples plunging thro' the thunder-storm;
> Till the war-drum throbb'd no longer, and the battle-flags were furl'd
> In the Parliament of man, the Federation of the world.

[1] What Can Literature Do for Me. C. Alphonso Smith.

Such writers may be said to have walked in the twilight zone of prophesies which are now being rapidly fulfilled. Sir Humphry Davy walked in the twilight zone of nitrous oxide anesthesia in 1800. Forty-four years later the Hartford dentist, Wells, made practical application of this knowledge. Farraday walked in the twilight zone of ether anesthesia in 1818, but not one of those who came after him stepped into the brilliant light of applied science till, in March, 1842, Crawford W. Long of Jefferson, Georgia, anesthetized James Venable with sulphuric ether and excised a cyst from his neck.

Without question many men must have walked in the twilight zone of ovariotomy. But it remained for McDowell, the Kentucky village surgeon, in 1809, to remove a sixty-pound cyst from Mrs. Crawford, without anesthesia, in his office, while the mob on the outside howled for his blood, to dispel the twilight of surgical impossibility and place another star in the firmament of professional achievement!

Look at Sims, born and educated in South Carolina and practising medicine at an Alabama cross-roads. He is now, and always will be, justly called the "father of modern gynecology." Note his despondency in his early years; see him tear down his tin sign and throw it into the well in the back yard. Observe him sell out his little belongings, and try to go into the clothing business. Think of it! J. Marion Sims selling "clodings!" Picture in your mind his first operation on Anarcha, using a bent spoon handle for a speculum. He fails, but he tries again and again, till twelve times he has failed. Oh, what a moving picture that would make! But look once more; he's walking down the street.[1] His eye chances to light upon a tiny spiral, lost, perhaps, from an old suspender. Inspiration seizes him. The scales fall from his eyes. He no longer walks in the twilight of failure. He sees clearly. If he only had a *silver* wire as fine as that bit of brass spring he could cure Anarcha's

[1] This picture of Sims is true to history. See Sims and His Work, by Wyeth, Trans. Southern Surg. and Gynec. Assoc., viii, 9.

vesicovaginal fistula. He has it; he succeeds! Eureka! See; this gavel made from a leg of Sim's operating table bears mute testimony to the greatness of its illustrious master!

The twilight zone! It's only the old, old story of genius groping in the dark for the unknown. It's the gift of prescience in the awakeningt! Tyndall said: "The greatest discoveries of science have been made when man has left the region of the seen and known and followed the imagination by new paths to regions before unseen."

Varro, in 127 B. C., clearly taught that infectious diseases were caused by microörganisms. Two centuries before Koch became famous through his brilliant researches in bacteriology A. von Leeuwenhock, of Delft, looking through a simple lens of short focus discovered bacteria. It was no fault of the Dutch scientist that the world was slow to appreciate his unrivaled contribution to science.

The profession gives credit to him who gets there first. The first anesthesia; the first ovariotomy; the first cure of vesicovaginal fistula; the first hip-joint amputation in America done by Brashear of Kentucky, in 1806; the first removal of half of the lower jaw by Deadrick of Tennessee, in 1810; the first total removal of the clavicle done by McCreary of Kentucky, in 1813; the first successful ligation of the innominate artery by Smythe of New Orleans, in 1864, *et al.*

But I must hasten on. Moreover, priority is by no means the only claim the southern surgeon has upon our appreciative memory. The limits of this address forbid anything more than the barest mention of a very few of the men whose services in time of war and peace have forever endeared them to our people. There is Paul F. Eve, famous in the Polish War and our own Civil War, and no less great as a teacher of surgery. Twice was he called to the University of New York, once to succeed Valentine Mott. Mattauer of Virginia did seventy-nine lithotomies with only four deaths (5 per

cent.). Briggs, one of our founders, and an incomparable teacher of surgery, four times called to other schools, did two hundred and seventy-four lithotomies with only eleven deaths (4.7 per cent.). Dudley of Kentucky did two hundred and twenty-five with three deaths (1.33 per cent.). Winslow of North Carolina did ninety-nine with one death (1 per cent.). All this and infinitely more before the days of aseptic surgery and some of it prior to anesthesia. Yandell, another of our Fellows, was a surgeon of unusual ability and distinction. Robert Batty's name deserves to go down with the world's celebrities.

I said there were heroes among southern physicians. Two instances only must suffice. When I was a student in Vanderbilt University, Professor Thomas Menees would each year bring his grandson, four or five years old, to the lecture hall, stand the little fellow upon the speaker's desk, and with tears in his eyes tell the story of his son, the boy's father, laying down his life in his efforts to rescue the yellow fever sufferers in Memphis in 1878. T. O. Summers, who went with young Menees, was spared to become one of our founders. McGuire tells us of kneeling beside a southern surgeon at Cold Harbor whose side had been torn away by a shell. When told that his wound was mortal, the dying man replied, "I am no more afraid to die than I was to do my duty." But why prolong this list? The task is too great. I could not even call the roster of the illustrious dead of the South, though we omit the names of such men as Thomas and a multitude of other Southerners, who went North or elsewhere and became leaders in their profession.

Like the independence of the Colonies, the redemption of the South, the achievements of our predecessors, and many other good things that we enjoy, the Southern Surgical and Gynecological Association was born of the exigencies of the times. Dr. Haggard, our first president, said in his address (1888), "It did not spring voluntarily into existence but was the outgrowth of necessity."

As is true of most mortals, especially those who start with large cranial development, its natal day was not consummated without much pain and labor; but since "joy cometh in the morning when a man child is born," let us forget all the unpleasant features in our rejoicing over present realizations and future possibilities.

As I read the history of books and men, the formation of this Association was due in part to the desire in the hearts of certain young "progressives" for better things, and in part to the wise counsel of older heads. The organization was hastened in no small degree and crystallized by the very antagonism which the movement engendered. It is of these men and movement that I wish briefly to speak.

It was my good fortune to have been a classmate of William Elias B. Davis in the Medical Department of Vanderbilt University and the University of Nashville. I have many reasons for remembering young Davis in those early years, one being that I had the temerity, in common with a number of other reckless youths, to contend with him for the distinction of being valedictorian of our class. The test was a speech delivered by each contestant before a meeting of the student body, under the supervision of a member of the faculty. It is only just to those ambitious young medicos, my competitors, to say "there were orators in those days." The speeches over, noses were counted, and amid much acclaim Davis was declared elected to deliver the valedictory. That Davis later became distinguished; that he developed remarkable ability as a surgeon, as an organizer, as a writer as an experimenter, as a leader among men; that he became famous before he was forty years old was no surprise, I am sure, to those who knew him in his college days.

Another man who made a deep and lasting impression upon me in the halcyon days of the long ago, as upon all with whom he came in contact, was the late W. D. Haggard, Sr., M.D., father of our distinguished secretary. Incidentally, allow me to say, the difference in the teaching of

medicine under the old régime and the new is strikingly shown by the fact that the first lecture I heard (1880) as a medical student was by Doctor Haggard, Sr., and the subject was "The Treatment of Secondary Postpartum Hemorrhage." As a teacher Dr. Haggard was clear cut, exact, honest. He was far-reaching in his knowledge of men and things. He was an arduous student always. His devotion to medicine and surgery, his enthusiasm, were catching. To the young men he was a safe and wise counsellor. To come in contact with him was like steel approaching a powerful magnet; his influence was irresistible. When the Davises, and Dixie Douglas, and John Wesley Gaines, for many years now a member of Congress, and W. H. Park, who, I understand, is the most influential white man in China today and upon whom the government recently conferred the Loh Tung Chia Ho Tsang, or the Golden Grain decoration of the sixth order, and many others, including your humble servant, sat beneath the spell of Haggard's teaching, he was already approaching the chloroform age. His was one of the most striking examples of a man in advanced years who was ever on the alert to learn all that was new and best in his profession.

I have it at first hand that the movement which culminated in the present organization was first called the Alabama Surgical Association. The prime movers were Drs. W. E. B. Davis, J. D. S. Davis, H. P. Cochrane, H. M. Rosser, and a few others. Dr. W. E. B. Davis took counsel with his old teacher, Dr. Haggard, who advised that gynecology be included, which was accordingly done. It soon developed that the new organization was considered by certain men in authority in the State Medical Society to be antagonistic to the latter. This feeling did not render the movement popular. Before the year was out it became patent that the plans must be changed or disaster would probably overtake the new enterprise; whereupon Dr. Davis, encouraged by the advice of Dr. Haggard, invited a consider-

able number of representative men throughout the South to meet with the Alabama Surgical and Gynecological Association in Birmingham to consider the advisability of organizing an association embracing the entire South. Only a few of those invited responded in person; about eighty wrote letters of approval. The result was the launching of the Southern Surgical and Gynecological Association, with Dr. Haggard as president and Dr. Davis as secretary.

At the end of its first year the new association was still wabbling upon its first legs. The issues were in doubt, perhaps more apparent than real. At this juncture Dr. Haggard telegraphed Dr. Hunter McGuire, who was not present at this or the former meeting, asking if he would accept the presidency. Dr. McGuire, who could sight at long range without the aid of an aeroplane, promptly replied that he would. Davis in his Presidential Address (1903) says: "When it became known that Dr. McGuire had accepted the presidency and was in sympathy with the organization its success seemed fully assured." It may very pertinently be asked: What organization could fail to go when inspired by the enthusiasm of Davis, censored by the wisdom of Haggard, and vitalized by the magic touch of McGuire?

What I have said is the briefest possible epitome of the history of the origin of the Southern Surgical and Gynecological Association. Also the credit given to the promoters is meager compared to the magnitude of their labors. But what about those who contributed to its formation and growth, whose names have not as yet even been mentioned? It is to be regretted that the properties of good usage will not permit us to discuss those who are still with us in the flesh.

Could we send a wireless across the Styx, which, according to Greek mythology, flows seven times around the World of the Dead, and ask Davis and Haggard and McGuire if they, and they only, deserve credit for this monumental

Association, we may be sure that the answer would come back somewhat after this fashion: "Nay, verily; there be George J. Engleman, and J. McFadden Gaston, and Bedford Brown, and Cornelius Kollock, and Richard Douglas, and A. M. Cartledge, and Manning Simmons, and David W. Yandell, and Joseph Price, and W. W. Potter, and B. E. Hadra, and H. H. Mudd, and F. T. Meriwether, and Chas. M. Rees, and Roswell Park, and T. J. Crofford, and Henry F. Campbell, and Lehman H. Dunning, and Willis G. MacDonald, and J. C. Munro, and Jos. T. Jelks, and Jno. C. LeGrande, and H. P. Cochrane, and W. B. Rogers, and John S. Cain, and Claudius H. Maston, and James B. Murfree, and Herbert N. Nash, and Wm. R. Pryor, and Benj. W. Taylor, and J. T. Wilson, and Thaddeus A. Reamy, and R. B. Maury, and W. F. Westmoreland, Sr., and R. A. Kinloch, and Virgil O. Hardon, and De Saussure Ford, and W. T. Briggs, and A. B. Miles, and J. T. Y. Paine, and W. H. Wathen, and A. H. Ferguson, and Maurice H. Richardson, and a host of others, all of whom contributed their quota to the upbuilding of the Southern Surgical and Gynecological Association, and without whose support it could not have survived. These celebrities, having ceased from their labors, rest with us under the shade of the trees whose leaves are for the healing of the nations."

Friends, I have read the histories and looked upon the portraits and statuary of our nation's founders; I have stood with uncovered head in the presence of the ashes of Britain's mighty dead; I have gazed in awe at the sarcophagus of France's hero Emperor, whose mighty step made the world tremble; I have walked through the gorgeous palaces of the Hapsburgs; I have sat beside the soft blue waters of the Lucerne, where William Tell is said to have rested; I have studied in Edinburg's famous Royal Infirmary, founded and granted by a scion of my own ancestry; yet I declare to you that in neither instance was I more impressed, more overwhelmed with the sanctity of the presence by which I

stood, or more visualized by the greatness of their achievements, than I am tonight as I humbly stand in your presence contemplating the lives of our illustrious predecessors, the fruits of whose labors we are privileged to enjoy.

We are to be congratulated that the grim reaper has robbed us of only a single Fellow during the current year. For him and his loved ones we mingle our tears. In this connection allow me to add that it is the source of the greatest gratification to see the vacancies which unfortunately must occur in our ranks rapidly filled by men of supreme ability and renown, the very choice of the land. Indeed, we could not afford to admit any one except he be properly prepared, thoroughly grounded in ethics, loyal to an organized profession, possessed of an unsullied character, and give promise of untiring zeal.

A careful study of the Constitution and By-laws shows that this Association was not only founded upon sound principles but that its provisions have been amplified from time to time to meet changing conditions, adapting itself always to that which was most expedient. For instance, at first the membership was limited to one hundred; now it is two hundred. Formerly no Honorary Fellows were permitted; now the Constitution provides for twenty-five.

Being a Southern institution, only southern men were embraced within its membership at first. Even on this limited basis the horizon of its possibilities widened so rapidly that early in the history of the Association it was determined to invite eminent men from north of the Mason and Dixon line to become members. In my humble judgment this is one of the very wisest things the Association has ever done. I cannot overstate the advantages which have grown out of this innovation. While the Association will ever remain Southern in name and habitat, it has long since become national in its membership and world-wide in its sphere of influence! Science, men of science, humanitarians, know no geographical boundaries, nor nationality, nor creed,

either political or religious! To them there is no Mason and Dixon line! We be brethren in the truest sense of the word!

The Constitution as first adopted says: "The object of this Association shall be to organize the profession of the South in the most efficient manner possible for the advancement of the sciences of surgery and gynecology." A few years later, and ever since, the same article reads: "The object of this Association is to further the study and practice of surgery and gynecology among the profession of the Southern States." Note the difference. In the first instance, "to organize the profession of the South" is stressed; in the latter this feature is omitted altogether, while "the study and practice of surgery and gynecology among the profession of the Southern States" is alone mentioned.

Now, then, in harmony with the wise changes that have already been made in this basic Article of the Constitution, and in view of the fact that we are no longer provincial, I recommend, by virtue of the exalted position with which you have honored me, that we drop the terminal words "among the profession of the Southern States" and let this Article read, as it is in fact, "The object of this Association is to promote the study and practise of surgery and gynecology."

In my opinion Article IV, Section I, which defines who may become members, should be so amended as to prescribe the minimum number of years the applicant must have practised his specialty and the percentage of his work devoted to surgery or gynecology, as the case may be. This section will, of course, include the plan, adopted by the Council last year, providing for applications and recommendations. I further suggest, as being more in keeping with the dignity of this body, that the designation "Fellow" be substituted for "member" wherever the latter occurs in the Constitution and By-laws.

Important as is our Constitution and much as we revere

it, we possess something higher and better. Call it the *esprit de corps;* or, if you please, "the unwritten law." I can best describe it by an illustration. Among the crown jewels, carefully guarded in the tower of London, there is to be seen a massive golden salt cellar. Now, tradition tells us that with the nobility the salt cellar plays an important rôle. On the dining table, the place where it is set, marks the dividing line, the guests of honor sitting above; those not so distinguished must sit below the salt cellar. In the great annual three-day feasts of the Southern Surgical and Gynecological Association the salt is placed before every man's plate. Ours is a true democracy! I confidently believe that this feeling obtains with every Fellow, whether he be from the South, the North, the East, or the West.

In preparing for this meeting I read every presidential address and *In Memoriam* in the twenty-six volumes of *Transactions;* also much of the other data found therein. One cannot study these historical records without being impressed with the high order of ability, the sincerity of purpose, the exalted character of the men who made them. The *Transactions*, taken as a whole, bear testimony to a comprehensive understanding of the mission of surgeons and gynecologists, of the inestimable value of organized effort, of the demand for higher education, and of the part incumbent upon this Association in the development of the science and practise of surgery and gynecology. The responsibility of maintaining this high standard rests upon us, we could not shirk it if we would. It may be truly said that this Association is a heritage from our famous predecessors. I rejoice to believe that their mantle has fallen upon our shoulders. May we wear it worthily!

The American people have long since come to appreciate the greatness of the Virginia statesman who wrote the Declaration of Independence. As generations come and go, and our institutions adjust themselves to the principles of that immortal document, we see more and more clearly the

wisdom, the statecraft, the prescience, its author must have possessed. Those of us living today have inherited an abiding faith in Jeffersonian doctrines. We cling to them with every assurance that their embodied wisdom as shown by their adaptability to the necessities of a free and independent people is a guarantee that shall ever, shall ever, safeguard our national life and preserve inviolate the rights of the individual!

Recently I had the pleasure of examining an African tree-drum. It is a wonderful instrument, hewn from the trunk of a tree, without membrane or other addition. The slightest tap of my finger set in motion sweet-toned vibrations. Under suitable conditions the tree-drum can be heard for ten miles. It is used to communicate from village to village, antedating by untold centuries the Marconi wireless. Dr. W. R. Lambeth told me that while traveling through the heart of the Congo with a caravan of sixty men his provisions gave out. He applied to one of the native villages for supplies. By means of a relay of tree-drums they sent a message for a distance of thirty-five miles, securing the desired necessities. On another occasion Dr. Lambeth telephoned a hundred and thirty miles after the same manner.

As I listened to the marvelous sounds of the tree-drum, and realized what a part it plays in the lives of the natives of the dark continent, I exclaimed, "Oh, tree-drum, tell me of your people, their origin, their traditions, their religions, their customs, the wrongs that have been heaped upon them, the subjugations they have had to endure! Oh, tree-drum, whisper to me a note of prophecy. What will civilization, and the missionary, and the medical man, and science do for your people? Will they lift them from the slough of ignorance, and superstition, and disease, and sin, and bondage, and set Africa as a jewel among the continents of the world?" And with the ear of faith pressed close to its resonant bosom, I heard a note of triumphant optimism come echoing back to me!

I need not apply these two homely illustrations connecting the past with the future, the one taken from our national compass and the other from the jungles of Africa. They suggest their own application.

Friends, what I have said is simply a review of that which you already knew better than I; something of the famous surgeons of our southland, the origin of our Association, the personnel of a few of its Founders, the broad and enduring basis upon which the organization was builded, its purpose and scope as indicated by its Constitution, and *Transactions*, the high order of work being done, the celebrated men composing its ranks in the past as well as the present, the esteem in which our Fellows are held at home and abroad, the continually increasing number of worthy men who are knocking at our door, the delightful democracy that pervades our deliberations—and leave it with you, Sirs, to judge whether or not we are justified in saying: The wisdom of the past is a prophecy of the future!

(Following the address Dr. Long showed twenty-five lantern slides of famous Southern surgeons and Fellows of the Association.)

CANCER OF THE TESTIS

CONTAINING A REPORT OF SIXTY-FOUR CASES, WITH SPECIAL REFERENCE TO TWELVE CASES OF CANCER OF THE UNDESCENDED TESTIS

By William B. Coley, M.D.
New York

Whether the undescended testicle is more liable to be the seat of malignant disease than the normally descended testicle, is a question that has never been fully settled. The opinion generally held is that the undescended testicle is more likely to become malignant than the normally descended testicle. The most comprehensive study of this question in recent time, is that of Dr. Kenneth Bulkley, of New York, on "Malignant Disease of the Testicle Retained within the Abdominal Cavity" (*Surgery, Gynecology and Obstetrics*, vol. xvii, 1913). The literature on this subject is exceedingly meager.

Blanck's collection in 1906 showed only 19 cases of malignant tumors of the testicles, but Bulkley has collected 57 cases from the literature, and to this he has added 2 hitherto unreported cases from the Presbyterian Hospital of New York, making a total of 59 cases of sarcoma of the abdominal variety of ectopia.

Bulkley states that for years it has seemed to be a surgical superstition that the testicle retained within the abdominal cavity, is prone to undergo malignant degeneration. Many

of the older writers, Dupuytren, Arnot, Gowers, Lecompte, Godard, and Spry, having called attention to it before Johnson, in 1859, put the first case on record. Godard, however, records a very remarkable personal experience, stating that he has observed 8 monorchids suffering from sarcoma, in 7 of which the disease had occurred in the undescended testicle, and in the eighth, in the normally descended testicle. He gives, however, no detailed report of the cases.

Bulkley found no cases reported prior to 1859, and only 57 since that time in the medical literature of France, Germany, Russia, Italy, and the English speaking races. He attempts to estimate the relative frequency of the condition from the various statistics, and quotes Eccles' analysis of 60,000 male admissions to the General London Hospital, showing 38 cases of sarcoma of the testis, of which one occurred in the undescended testicle.

Howard found in 110,000 male patients admitted to various London hospitals during a period of twenty years, 65 cases of malignant disease of the testis, of which 9 occurred in the ectopic testicle, all of the inguinal variety, and none of the abdominal. Bulkley adds new data derived from a record of 12,729 consecutive male admissions to the Presbyterian Hospital of New York, giving 13 examples of malignant tumor of the testis, of which 11 were situated in the scrotum, and 2 in the abdomen. Combining these statistics we find that, of 182,729 male admissions to general hospitals, there were 116 cases of sarcoma of the testicle, of which 12 occurred in the undescended testicle, only 3 of these occurring in the intra-abdominal testicles, or about one in each 60,000 cases.

At the Hospital for Ruptured and Crippled, from 1890 to 1907, in 59,235 cases of inguinal hernia in the male sex, there were found 737 cases of undescended testis. However, it should be noted that the statistics of the Hospital for Ruptured and Crippled, or of any large

hernia clinic, do not give a fair estimate of the relative proportion of cases of sarcoma of the undescended testicle, inasmuch as many of these cases, particularly those of abdominal ectopia, will seek relief at some general hospital rather than go to a hospital devoted specially to the treatment of hernia.

My own personal statistics throw some further light upon this question. During the past twenty-five years I have personally observed 64 cases of sarcoma of the testicle. The first 25 of these cases occurred in the normally descended testicle; in the next two cases, however, the disease occurred in the undescended testicle. On going over my entire series I find that in 52 cases the disease occurred in the normally descended testicle and in 12 cases in the undescended testicle.

Different writers give different opinions as to the relative frequency of cancer of the normally descended, and maldescended testes. Shoedel encountered 5 cases of cancer of the inguinal testicle compared with 36 cases of cancer of the normally placed organ; Odiorne and Simmons in a review of 54 cases of malignant disease of the testicle, observed at the Massachusetts General Hospital, found 6 or 11 per cent. in which the disease occurred in the undescended testis. Of these, 4 were in the abdominal cavity, and 2 in the inguinal canal. Rademacher gives the proportion of malignant abdominal to malignant inguinal testicle, as 1 to 8. Meiser found 64 malignant inguinal as against 4 abdominal testes. Bulkley, himself, however, found at the Presbyterian Hospital 2 cases of malignant abdominal in 12 cases of malignant inguinal testes. An analysis of these cases encountered by Chevassu, Odiorne and Simmons, and the Presbyterian Hospital records, show the proportion as 1 to 5. My own statistics show almost the same proportion; 12 undescended in a total of 64 cases of sarcoma of the testis, or about 1 to 5.

The influence of trauma upon the development of sarcoma

of the undescended testicle is less clear than in the case of the normally descended testicle. Bulkley states that only 2 cases of the abdominal type gave a history of direct trauma. He mentions the possibility of trauma from the contraction of the abdominal muscles as a factor in those cases in which the testicle lies at, or near, the internal ring.

As regards the age of development, 42 or a little over 75 per cent. occurred between the ages of twenty-five and forty-five years. This shows that the age of development of sarcoma of the normally descended testicle is practically the same as that of the undescended testicle, as shown by Kober, who found that 71 per cent. of 114 cases of scrotal sarcomas of the testis occurred between the ages of twenty and fifty years.

As to the pathology of Bulkley's 59 collected cases:

20 were	classed as	sarcoma;
10 were	"	round-celled sarcoma;
6 were	"	large round-celled sarcoma;
1 was	"	spindle-celled sarcoma;
1 was	"	mixed sarcoma;
1 was	"	myxosarcoma;
1 was	"	cystic sarcoma;
2 were	"	teratoma;
2 were	"	epithelioma;
2 were	"	chorio-epithelioma;
7 were	"	carcinoma;
1 was	"	rhabdomyoma;
5 were	"	cancer.

The Clinical Diagnosis of Cancer of the Undescended Testis. If the testis is in the inguinal canal, or inside, or just outside of the ring, it is possible to make a fairly early diagnosis, the signs or symptoms being not unlike those found in connection with sarcoma of the normally descended testicle. If, however, the testis is situated in the abdominal cavity, the diagnosis is rarely made until

the disease has reached a fairly advanced stage. Acute abdominal pain is often the earliest symptom. Usually there is a history of dull dragging pain in, or over, the iliac fossa. If the trouble is on the right side it is not infrequently mistaken for appendicitis. In several cases, I have known operation to have been performed in the belief that the condition was that of appendicitis. After a few weeks, in some cases months, these irregular symptoms are usually followed by the appearance of a smooth oval or round tumor in the lower iliac fossa, more or less tender on pressure. In some cases slight fever accompanies the condition.

The temperature is usually normal. Sometimes the condition becomes so far advanced before a diagnosis is made, that marked swelling of the leg occurs accompanied by severe lumbar pain. Bulkley's statistics show four cases of strangulation with twisted pedicle to have taken place, in all of which there was an acute onset with abdominal pain, fever, nausea, vomiting, and objective signs of an acute abdominal lesion. In most cases the tumor is fairly well fixed and not very movable.

Furthermore, Bulkley found only nine cases in which the presence or absence of offspring was definitely noted. Five of these were single cryptorchids, and were fathers of children; four had no children, only one of the latter being a double cryptorchid. Bulkley states that not a single case of double cryptorchid with malignant testicle has as yet been reported as having offspring. This statement will have to be modified since the publication of McGlannon's paper, read before the Southern Surgical and Gynecological Association at Atlanta, December, 1913.

Differential Diagnosis. The first and most important step in the diagnosis is a careful examination of the scrotum with a view to determining the presence or absence of a normally descended testicle. This, however, has been omitted in many of the recorded cases. Before the disease

has advanced sufficiently to form a palpable mass, it may be very difficult to make a diagnosis, as the condition cannot be easily differentiated from that of renal colic, appendicitis, or cecal tumors. If the testis cannot be found either in the scrotum or inguinal canal, and a tender mass is felt in the lower iliac fossa, giving rise to the symptoms already mentioned, the chances are very strong that one is dealing with a malignant ectopic testicle.

Tuberculosis of the abdominal testis is remarkably rare, as is likewise acute inflammation of the abdominal testicle.

There have been found a few cases of abdominal orchitis of gonorrheal origin, but no cases of syphilitic abdominal orchitis have as yet been reported.

Prognosis. The prognosis in these cases is exceedingly bad, due apparently to the fact that an early diagnosis is at present seldom made. In 5 cases the nature of the condition was not recognized until an autopsy was performed.

The results in Bulkley's 59 collected cases, show the gravity of the condition. In 37 cases excision was done with an operative mortality of 10 per cent. Of the remaining 22 cases, 18 only were traced. Seven cases remained well, but in the majority of these the interval of time which elapsed between the operation and the date of report, is much too short to draw any conclusions to a permanent cure. Only 1 patient out of the 37 was well over three years; and but 3 remained well over two years.

The question of prophylactic treatment is an important one, inasmuch as it may mean the removal of a testis before a malignant growth has occurred. Bulkley believes that from present statistics we can roughly state that one in every 75 abdominal testes will become malignant. In his opinion, if the individual has one testicle in the scrotum, the abdominal testis should, after puberty, be removed. He states that 37 of the collected cases were single cryp-

torchids developing malignancy in the abdominal testicle, and that all would have been saved had an abdominal orchidectomy been done before the onset of malignancy, that is, shortly after puberty. In the case of a double abdominal cryptorchid, operation would not be advisable except in the presence of objective signs.

Bulkley's argument is based upon the assumption which he believes to have been proven by statistics, that 1 in every 75 abdominal testes will become malignant. Personally I do not believe that we have sufficient data at present to warrant us in accepting this estimate. I believe it is much too high. Inasmuch as the condition is usually associated with a hernia, I believe it justifiable to operate, and only in those cases in which it is found impossible to bring the testicle down into the scrotum, would I sacrifice the testicle. My series of cases show that the trauma incident to the operation of bringing down the testis into the scrotum, may have been the exciting cause of the sarcoma in at least one case.

Bilateral sarcoma of the undescended testes is exceedingly rare. Bulkley's collection of 59 cases shows only 2 examples, to which has since been added 1 case by Dr. Oliver C. Smith, of Hartford, Conn.[1] A careful search of the literature by Dr. Smith failed to find any other cases. A brief history of his case is as follows:

Male, aged thirty-eight years, farmer, white, married, no children. Both testes absent since birth. Eight years previous, patient had suffered from painful swellings in both inguinal canals, following an attack of mumps. Two months before operation he noticed enlargement in both inguinal canals, followed by rapid growth and considerable pain on one side.

Physical Examination, at the time of operation, July 10, 1913, showed both iliac fossæ and inguinal canals occupied

[1] Boston Medical and Surgical Journal, May 28, 1914, p. 839, vol. clxx.

by large, "fluctuant" tumors, the right extending from the upper margin of the scrotum to above the umbilical line. The tumor upon the left side occupied the inguinal canal and was less tense. Both testes were absent from the scrotum. Operation revealed an enormous fusiform cyst of the tunica vaginalis, containing 75 c.c. of clear straw-colored fluid. In the upper portion was a hard irregular mass. The tissues of the cord, including the vessels and lymphatics, were dissected beyond the internal ring; the vas deferens was followed as far down as possible toward the pelvis and removed. A similar operation was performed on the left side, at which time about half the amount of fluid as was found on the right side, was removed, together with a malignant testicular tumor. The operation was followed by but little reaction, and primary union resulted. The pathological report made by Dr. John Carter Rowley (pathologist at the Hartford Hospital) read: "large, round-celled sarcoma of each organ." Recurrence followed in eight months and death a few months later.

I have to add another case, which will be found in my report of cases.

The Duration of Life in Cancer of the Testis (Scrotal Cases). Cancer of the testis must be looked upon as a particularly malignant type of cancer and the course of the disease is considerably shorter than in most other types. My own series of cases shows that in 48 of the fatal cases, in 29 the duration of life was one year or less. In every one of the 4 cases in which it was over three years, the toxins had been used. In one case of five years' duration, it was stated that the tumor had existed four years before operation. In this case it is possible that the tumor was not malignant during the entire period, but a malignant degeneration occurred in an older and benign process.

The duration of life in cancer of the undescended testis is worthy of special note, it being much shorter than in the

ordinary scrotal type, varying from three months to eight years. In 7 of the 12 cases death occurred within less than one year from the beginning of the first symptom. Only 3 cases lived over three years, one three and a half, one six, and one eight years, and in all of the latter the mixed toxins were used after operation.

Death occurred within one year after operation in the majority of the cases. Of 48 fatal cases, 29 died within one year after operation. In the 6 cases that lived over three years and then died, the patients were treated with the mixed toxins of erysipelas and Bacillus prodigiosus in four. This treatment probably retarded the progress of the disease, although it did not result in a cure.

Chevassu's statistics show the duration of life in fatal cases to be as follows:

Unknown in 15 cases;
15 days to 1 year, 38 cases;
1 to 2 years, 17 cases;
2 to 3 years, 9 cases;
3 to 4 years, 2 cases.

In other words, death occurred before three years in nearly all of the cases, and in 74 per cent. death occurred one year after operation.

Chevassu in an important paper on "The Surgical Treatment of Cancers of the Testicle" (*Rev. de Chir.*, vol. xli, 1910), has made the first attempt along scientific lines to ascertain the actual results following the surgical treatment of cancer of the testicle. Beginning in 1894 he gradually collected statistics based only upon tumors of the testicle in which the same histological examination was practiced, and in 1906 he published an elaborate paper on "Cancer of the Testicle" (*Thèse de Paris*) in which he reported 85 cases. His later work (*loc. cit.*, *Rev. de Chir.*) contained 100 cases.

Chevassu calls attention to the extremely pessimistic

views as to the curability of cancer of the testis, expressed by classical writers, and still held by the great majority of modern surgical authorities, *e. g.:*

Reclus (Duplay and Reclus, 2d edition, 1899, T. VII), who states that malignant tumors of the testicle are not only fatal, but are so rapidly fatal, that one almost asks the question if operation may not hasten generalization.

Sebileau (Le Dentu et Delbet, 1901, T. 10, p. 241). "Notwithstanding one hastens to perform castration, it seems almost always too late, inasmuch as a recurrence, and an apparently rapid one, uniformly follows up."

Arrou (Richard et Rochard, *Chir. de l'appareil génital de l'homme,* 1901, p. 239). "Castration has never cured an individual suffering from cancer of the testicle."

Monod and Terrillon (*Traite des maladies du testicle,* 1899, p. 619). "Castration does not give any general hope of life to patients operated upon."

Other well-known authorities, such as Paget, Curling, Kocher, Le Dentu, Duplay, Most, Chalot, etc., might be quoted to confirm the same opinion. Chevassu states that they all admit the constancy of recurrence, and the few examples of cure that have been published, they regard as so exceptionable as to make it possible to question the exactness of the diagnosis.

Pousson (*Gaz. hebd. des sc. med. de Bordeaux,* September 12, 1909) expresses an even more pessimistic opinion as to the hopeless prognosis of tumors of the testicle. He states: "Sarcoma may sometimes be cured, but epithelioma, never. For my part, I have never seen a cure. I consider an attempt to remove the abdominal glands as useless. I do not believe that the search for the glands in any way improves the results."

American authorities, *e. g.,* Dr. Bevan (Keen's *System of Surgery*), expresses the same opinion, and states that he has never seen a cure, no matter how early operations were performed.

Chevassu's statistics, based upon 100 cases very carefully collected and analyzed, prove that these gloomy views are not in entire accord with the actual facts. The operative prognosis of cancer of the testicle, while still very grave, is not as bad as it has been pictured. Instead of an occasional patient surviving operation, and this being explained as a mistake in the diagnosis, Chevassu shows, that in 100 cases, in which there can be no question as to the diagnosis of malignancy, 19 patients were found alive and well from four to ten years after operation. A study of the histological type of these cases of survival is of great interest. He classes them as follows:

Of 47 cases described as "epithelioma seminal," 16 were cured; that is, well from four to ten years.

Of 50 cases classed as "mixed tumors" only 3 were cured.

Of the 3 remaining cases classed as "sarcoma" all died.

The more one studies the recent attempts of the pathologists to classify malignant tumors of the testicle, into a large number of distinct groups, the more futile seem such attempts, inasmuch as each one of the many types depends upon the histological character and arrangement of the cells, which is differently interpreted by nearly every observer. For example, take the two most recent, and by far, most important contributions to the study of tumors of the testicle published by Chevassu (*loc. cit.*) and Ewing ("Teratoma of the Testis and its Derivatives," *Surg., Gynecol. and Obstet.*, March, 1911). Ewing believes that practically all cases of malignant tumor of the testicle should be classified as teratomas, or carcinomas derived from teratomas.

Of the 100 cases of Chevassu, he only classes one as a teratoma. He classifies his cases thus: 1. Epithelioma seminal, or seminome, 47 cases; 2. Sarcoma (rare), 3 cases; 3. Mixed tumors, 50 cases. As regards his group of so-called "mixed tumors" 50 out of a total of 100, he subdivides them as follows:

1. Teratomas, or tumors benign.

2. Tumors properly called "mixed tumors," polymorphous or heteromorphous. These tumors are originally benign, but later assume a tendency to degeneration.

3. Epitheliomas, sarcomas, placentomes, etc., in which one no longer finds remains of mixed tumors (cartilage, muscle, etc.), but which have absolutely the same structures as certain malignant degeneration of malignant mixed tumors.

In regard to teratomas, Chevassu states that they are usually benign, but susceptible to malignant degeneration. Of 6 teratomas, in which he followed up the after history, only one presented microscopical manifestations of degeneration, and this alone, proved fatal.

Ewing in his paper presents a very lucid and exhaustive study of tumors of the testis, particularly bearing upon the etiology of such tumors. He calls attention to the fact that the formerly extensive group of sarcomas, has been narrowed by the elimination of many cases of carcinoma which were once regarded as alveolar sarcoma.

Ewing advances the view that practically all malignant tumors of the testicle originate from a pre-existing teratoma, and he takes issue with Chevassu, who believes that his class designated as "seminoma" originate from the epithelial cells of the seminal tubules and are entirely unrelated to teratoma.

I have neither the requisite knowledge, nor is this the proper place to discuss the relative merits of these opposing theories. I wish merely to point out that before entirely accepting Ewing's conclusions, much additional evidence must be offered. The most important objection to this theory is, that in a very large number of cases of cancer of the testicle no teratomatous elements are found. Ewing explains the absence of these elements, by assuming that a pre-existing teratoma at the time of operation, had already been destroyed by the advancing carcinoma. This

is a broad assumption and comes dangerously near "begging the question."

I still consider it the wiser plan to make a separate group of those tumors which show typical histological characteristics of teratoma, as Chevassu and Wilms have done. This group of tumors will be found to present markedly different clinical features from the larger group of tumors, which have been almost universally designated as sarcoma by the older pathologists, but more recently have been classed as carcinoma or mixed tumors. This larger group of cases, exclusive of the teratomas proper, have a very similar clinical history, and in harmony with that of carcinoma rather than sarcoma. Hence, I believe that the old idea of classing them all as sarcoma was probably an error. Like carcinoma, they have a strong tendency to involve the neighboring lymphatic glands, and again, like carcinoma, they are much less strongly influenced by the mixed toxins of erysipelas and bacillus prodigiosus, than sarcoma.

Is it not possible to assume that a pre-existing teratoma may play a secondary and minor part in the etiology of malignant tumors of the testis, such as the dermoid cysts play in malignant disease of the ovary, or as chronic mastitis, or benign adenomas play in the development of cancer of the breast? They simply offer a point of least resistance or a favorable soil for the development of the disease. No matter what views we may hold as to the etiology of these tumors of the testis, the wide difference of opinion as to their classification that exists among pathologists at present furnishes a very good reason for reverting to the old and comprehensive term "cancer," which includes all varieties of malignant tumors. This was evidently the opinion of Chevassu, for he groups all his cases as "cancer of the testicle."

In 1901 (*Annals of Surg.*, September, 1901), Dr. B. H. Buxton and I reported before the New York Surgical

Society a very typical case of teratoma of the testicle, in which a very careful microscopical study was made by Dr. Buxton. In this report we stated:

"Wilms' paper (*Beiträge zur Pathologischen Anatomie*, Ziegler, Band xix) is undoubtedly the most complete and valuable work we have upon teratoid tumors of the testis, but we must remember that it was written entirely from the point of view of the pathologist.

The material upon which his paper is based comprises ten tumors of the testis observed by himself at the Pathological Institute of Giessen, and which he classes as 'Mischgeschwülste des Hoden,' and fifteen others, classed as dermoid cysts, that he has collected from literature. To show the confusion that has existed up to the present time, and still exists, as to the classification of these tumors, we need only to note that the original microscopical diagnosis in the ten cases which he classes as teratoid tumors was as follows:

The first case was classed as a myxosarcoma;
The second as a cystosarcoma;
The third as a carcinoma;
The fourth, mixed tumor of the testis;
The fifth, carcinoma;
The sixth, medullary carcinoma;
The seventh, cystoma;
The eighth, cystoid disease of the testis;
The ninth, cystosarcoma of the testis;
The tenth, teratoma, with malignant degeneration.

I do not think we should adhere too literally to the view of the pathologist, that these teratoid tumors are non-malignant. In 2 of Wilms' 10 cases the subsequent history proved them to have been malignant, and in several of the remainder the after-history was not traced."

The Prognosis of Cancer of the Testicle. The prognosis of sarcoma of the undescended testis, as I have already stated, is exceedingly grave. Bulkley's entire series of 57 cases of sarcoma of the testis, shows only one,

in which the patient remained well over three years. My own series of 11 cases, show two patients living beyond three years.

The nearest approach to a cure has been my case, Dr. B., in which a very extensive tumor was removed by Dr. J. B. Murphy, who sent him to me immediately after he had recovered from the operation, for prophylactic treatment with the toxins. When he reached me there was already marked induration in the iliac fossa and abdominal wall, whether due to a recurrence or an inflammatory condition resulting from the operation, it is impossible to state. At any rate, the induration disappeared under the toxin treatment and the patient remained well for three years, and then died of a probable recurrence in the lung, but it is not entirely certain, as he had been suffering from tuberculosis of the lungs for some time before he developed the carcinoma of the testis.

Of my other cases of cancer of the undescended testis, one of the inguino-superficial type, operated upon by Dr. Howard Lilienthal, and treated by him with the mixed toxins of erysipelas and bacillus prodigiosus, under my direction for several months, is still well six years thereafter.

Until recently few statistics have been available upon which to base any very definite conclusions as to the actual prognosis of sarcoma of the testicle. The most important recent statistics are found in the paper of Kober,[1] Chevassu[2] and Codman.[3]

Of 114 cases collected by Kober, which were treated by operation, 37 were not traced. Of the remaining 77, 41 died in from a few days to three years. Of these 41 fatal cases, 23, or 56 per cent. died within five months, of metastases; 11 others died from seven to twelve months after operation, making 83 per cent. of the fatal cases that died

[1] Amer. Jour. Med. Sci., 1899, vol. cxvii, p. 35.
[2] Thèse de Paris, 1906, and Rev. de Chir., 1910.
[3] Boston Med. and Surg. Jour., February 19, 1914, p. 267.

within the first twelve months after operation; 2 patients lived beyond three years, but died later of recurrence.

The most important statistic is that of Chevassu.[1]

Of 100 cases collected by Chevassu, 19 were living four years after castration. As to the histological type of tumor, in these cured cases, 16 were "epithelioma seminal" a tumor designated by Chevassu as seminoma. Only 3 were of the mixed type, ordinarily known as embryonal sarcoma.

A recent and important statistic is that found in a brief report of Codman, who collected 80 cases treated at the Massachusetts General Hospital within the last forty years, 63 having reports of pathological examinations of the specimens removed. Sixteen cases could not be traced. Of the 64 cases traced, 13 were living, 12 died of other causes; of these 10 had been operated upon; 39 died of the disease, 33 with and without operation, giving a mortality of the disease of 61.9 per cent. Of the 56 cases operated upon, 13 were living; average time after operation eight years; extremes two and twenty-eight years. Ten died of some other trouble; average time after operation, ten years; extremes, seven months and twenty-six years. Twenty-three, or 41.07 per cent., of those operated upon survived the disease. If 8 unoperated and 12 cases operated upon when metastases were evident, are excluded, we find that 52.27 per cent. were cured. From this study, Codman concludes that, "the prognosis of sarcoma of the testicle, while bad, is not, when operated, so universally bad as text-books would lead us to infer."

These statistics going back over a long period include a number of cases in which the diagnosis was not confirmed by microscopic examination and cannot fairly be compared with Chevassu's series or the later statistics of Hinman.

My own series of cases furnishes little data as regards the prognosis of sarcoma of the testis after operation, inasmuch as the great majority of cases were referred to me after a

[1] Thèse de Paris, 1906 and Rev. de Chir., 1910.

recurrence had taken place and many in a very far-advanced and hopeless stage of the disease; only 9 cases were operable when referred to me.

On the other hand, the very nature of this series of cases throws further light upon two very important questions:

1. Can anything be done after primary operation to improve the prognosis?

2. Can anything be done with even a remote chance of cure after recurrence has taken place?

The most recent statistical study giving the result of operative treatment of the testicle, is the admirable paper of Hinman, assistant resident surgeon, Johns Hopkins Hospital, read before the meeting of the American Medical Association, June, 1914.[1]

An analysis of the 32 cases reported is of great interest; 25 were admitted to the Johns Hopkins Hospital, two were not treated, and in seven the operation was performed outside and the specimens sent to the laboratory of Dr. Joseph C. Bloodgood for diagnosis. Seven of the tumors occurred in the undescended testis which, Hinman states, supports the accepted view that malignancy is relatively more common in men with undescended, than normally descended testes.

The age limits were twenty-four and sixty-seven years; 8 were under thirty years.

As regards trauma, it is stated that in 11 cases or 33 per cent. there was a history of some antecedent injury.

The duration of the disease from the time it was first noticed until operation varied from one month to twenty years. Hinman states that four cases of the series in which the patients are still alive, had a pre-operative duration of four months, two years, six years and twenty years. He concludes that the duration gives no clinical indication of the character or degree of malignancy.

He states that the pathologic material was personally

[1] Jour. Amer. Med. Assoc., December 5, 1914.

examined in 22 of the cases. Parts of all of these showed a picture typical of these testicular tumors and not duplicated by any other tumor, in the presence of characteristic large, round cells in a lymphoid or fibrous stroma. In 10 of the cases in addition to these typical areas of carcinoma cells there were found, either alone or in association, areas of cartilage or of cystic, glandular, myxomatous, fibromuscular, or embryonic connective tissues, which he states place them in the group of teratomas. The round cells of the simple-cell tumors were in all cases larger than lymphoid cells, and the round-cell picture in the two types of tumors was absolutely identical.

In the majority of the tumors in which cartilage was found it was present in small areas and might easily be overgrown by the more active carcinoma cells and this may have occurred in these pure-cell tumors. In 6 of the 10 cases in which no material was available for study, a previous microscopic diagnosis of alveolar or round-celled sarcoma had been made. Hinman states that in view of the fact that the previous diagnosis of the 12 pure round-cell tumors and of 3 of the mixed tumors had been some form of sarcoma, it is to be supposed that these 6 cases were either teratomas or a one-sided development of a teratoma. "These findings," he states, "only confirm those of Ewing, namely, that, clinically, all malignant tumors of the testicle are of teratomatous origin." Hinman states that there were a number of cases with the clinical diagnosis of malignancy in which the removed testicle, on subsequent microscopic examination proved to be the seat of syphilitic orchitis.

Metastases were clinically present at the time of the operation in 4 of the patients, all of whom died of carcinomatosis. Seventeen patients had retroperitoneal glandular metastases at death. In 8, death is said to have been due to general carcinomatosis and presumably lumbar metastases were present.

The ultimate result is known in 24 cases, of which 20 are dead, and 4 living. Of the 18 cases in which the result is known and the specimens have been examined, 9 are pure round-cell carcinomas and 9 are teratomas. Of the former group 2 patients are alive, one twelve the other thirteen years. None of the 7 patients that are dead lived over two years. Of the latter group (teratomas) all are dead except 1, who is now alive for only sixteen months. Hinman believes that this shows the higher malignancy of the mixed type, which is in accord with Chevassu's opinion.

In the 4 cases in which the material was not available for study, 1 is alive twelve years; the other 3 died one, two and eight years, respectively, after operation.

In view of the very bad prognosis of the ordinary surgical treatment of cancer of the testicle by removal of the testis and cord, Hinman strongly advocates the radical operation proposed by Chevassu in all cases, and gives the first complete resumé and analysis of the cases thus far operated upon by the radical method. He has collected 44 attempts at radical removal of the primary pre-aortic lymph area in treating testicular tumors. In view of the fact that over 7 per cent. of the few cases so far reported that have been subjected to the radical method were found on subsequent examination of the specimens to have had syphilitic orchitis, has induced him to advocate doing the operation in two stages; (1) simple castration and thorough histological examination of the tumor; (2) the operation for removing the lumbar glands. The latter is a very extensive operation and is carefully described by Chevassu and Hinman. It is, however, the results of the cases thus far operated upon that chiefly concern us here; 5 of the patients died of post-operative complications, 3 of pneumonia, 2 of peritonitis, giving an operative mortality of 11 per cent.

With the exception of two cases, there was no clinical evidence of lumbar metastases before operation. Of the remaining 42, 20 were living; 9 over two years, the longest

four years and ten months; the shortest one month. The average time since operation of the 20 reported alive is one year and eight months. Sixteen, or 41 per cent., have died of cancer, all within one year, except 2.

While the lumbar glands were palpable in only two cases before operation, 22 or over 50 per cent. of the cases showed cancer invasion of the lumbar nodes removed at operation, and in 11 of these the involvement was so extensive as to be inoperable. In 8 of the cases in which the lumbar glands were removed, subsequent microscopic examination showed no cancer invasion. In 3 no lumbar glands were found at operation. All of the 11 patients in whom the glandular involvement was so extensive as to render its complete removal impossible, are dead, except 2 who had been observed for only one month. Of the 14 patients with glandular involvement in which the glandular area was supposed to have been completely removed at operation, 7 are living, one died of pneumonia seven days after operation and 6 died of a recurrence of the cancer. Of the 8 patients with clean glandular removal, but in which no involvement could be found, 5 are living and 3 died of cancer. Two of the 3 in whom no glands at all were found, are dead. Of the 6 in which no mention is made of glands, 2 are dead, one and twelve months after operation; 3 are living, one, twelve and forty-eight months.

Of the 6 patients referred to who had glandular metastases removed, 1, in whom 2 of the glands removed at operation showed marked invasion, is now alive and well almost five years after removal; 3 other patients are alive with no evidence of recurrence for almost three years from the time the glands were removed, and 2 other patients were alive after operation, eight and one months, respectively, at the time of the last report.

Among the conclusions reached by Hinman are:

"Orchidectomy will cure from 15 to 20 per cent. of teratoma testis. Obviously a cure is possible only when the

testicle is removed before the onset of glandular or other metastases.

"The experience of various surgeons in a total of 46 cases has demonstrated in suitable cases the feasibility and technical ease of the radical operation with a combined surgical mortality in all cases of only 11 per cent."

At first sight, the argument in favor of the radical operation so strongly urged by Chevassu and Hinman, seems cogent and sound, but after a more careful analysis, several weak points appear. Taking Hinman's own figures, we find that about 50 per cent. of the cases subjected to the radical operation, showed no involvement of the glands at all, and hence, 22 patients had to undergo a very grave operation only to find that there was no occasion for it. The next and very important point is, that in 11 cases, or about 25 per cent. of the total number, the glands were found to be so extensively involved that the condition was inoperable. In other words, in 50 per cent. of the cases operated upon, no glands were present; and in 25 per cent. the condition was so far advanced as to make surgical removal impossible; thus, in 75 per cent. of the cases no benefit was offered from the operation.

We find then this very formidable operation with a mortality of 11 per cent., advised as a routine measure in all cases of cancer of the testicle, when it offers no hope of benefit in 75 per cent. of the cases. Therefore, it is clear that the only ground for justifying the operation must be the benefit that it offers in the small group of 25 per cent. of the cases, in which the glands were found at the time of the operation, and it was possible to remove them surgically. In this group we find, out of 14 cases operated upon, 6 died of recurrence, and 1 died from the operation, leaving 7 cases still living at the time of the report.

The duration of life after operation in these cases is insufficient to justify classing them as cures. Only one was well over three years. Therefore, at present we can safely

state that we have no data for estimating the number of actual cures. I do not believe the number of lives saved by the radical operation sufficient to offset the mortality of this operation itself.

Another serious objection to the operation, in my mind, is, that even though no glands are found after a most careful dissection, this does not mean that they are not present, since of eight cases, of Hinman's collection, in which no involvement could be detected after a clean removal of all the glands, three died of cancer. Another most striking fact is that, of the three cases in which no glands could be found, two are now dead from a recurrence.

Operation, Removal of Testis and Cord, Followed by Prolonged Toxin Treatment. I believe that my own series of cases show, that cancer of the testis treated by simple orchidectomy, without any appreciable risk, and followed by a thorough course of treatment with the mixed toxins of erysipelas and Bacillus prodigiosus (also without risk), have a far better prognosis than those subjected to the very extensive laparotomy with removal of the lumbar glands, as advocated by Chevassu and Hinman.

In comparing my own results with other series of cases of cancer of the testicle, it is important to note that my series represents an entirely different type of cases from the others, inasmuch as in the majority of cases the disease was far advanced at the time when the patients came under my observation. In only 9 the toxins were given immediately after primary operation before recurrence had taken place, and yet in spite of this, 13 patients were well beyond a period of three years, and only 2 of these recovered without the use of the toxins; furthermore, both were of the teratoma type, one almost a pure teratoma and probably not malignant; the other a teratoma with carcinomatous degeneration.

It is further worthy of note that 2 of the cases of this series were cancer of the undescended testis. In one case the toxins were used after operation and the patient remained

well over three years, when he died either of metastases or tuberculosis, probably metastases. In the other, the toxins were used as a prophylactic after operation; the patient is now well, eight years.

Very few recoveries from sarcoma of the undescended testicle are to be found in the literature.

The results in my own series of cases, I believe, shows conclusively the value of the mixed toxins of erysipelas and Bacillus prodigiosus, not only in inoperable cases, but also as a prophylactic after operation. A resumé of the cases well over three years shows:

1. Sarcoma, in which the toxins were used for several months immediately after operation; well eight years.

2. Carcinoma in which no toxins were used after operation; well four years.

3. A round-celled sarcoma of the testicle with metastasis in the tongue five years later. Microscopical examination made by Dr. Welch. Excision of tongue advised, but refused. Disappearance of the disease under the toxins. Patient well fifteen years.

4. Round-celled sarcoma; toxins used as a prophylactic. Patient well at present, two years.

5. Sarcoma; toxins used after operation for one year. Patient well when last heard from, nearly two years later.

6. Round-celled sarcoma, recurrent. Disappearance under the toxin treatment; well eight years.

7. Round-celled sarcoma, recurrent in other testicle; castration refused; disappearance under toxins. Patient well ten years.

8. Sarcoma; toxins used as a prophylactic after operation; patient well over three years.

9. Sarcoma of the undescended testicle; toxins given after operation. Patient well three years. Trouble complicated with tuberculosis of the lung; death probably due to recurrence, but may have been result of tuberculosis.

10. Teratoma; toxins used after operation; well over three years.

11. Sarcoma; toxins used as a prophylactic after operation; patient well over three years.

12. Sarcoma, recurrent; entire disappearance under toxins; patient well over three years.

13. Sarcoma; recurrent in other testicle; toxins used after removal of both testicles. Patient well eight years.

14. Sarcoma; toxins used as a prophylactic after operation; recurrence in the abdomen three years afterward; not controlled by further use of toxins; death a few months later.

One of the most convincing cases of the value of the toxins is that reported by Dr. Fredrick W. Robbins, of Detroit, in the discussion of Hinman's paper on "Tumors of the Testicle," read before the Genito-Urinary Section of the American Medical Association, June, 1914.[1]

This case was a rapidly growing tumor of the testicle, the size of a fist. The clinical evidence of malignancy was strong, inasmuch as the disease recurred within ten days after removal, and grew very rapidly. At a second operation a tumor the size of a closed fist was removed together with the contents of the scrotum and cord as far as the internal ring. Within ten days a second recurrence developed and grew with great rapidity. The toxins were then begun and were followed by cessation of growth within two days. They were continued for about three weeks, causing severe reactions and the tumor entirely disappeared and the patient is well at present, about six years later.

Dr. Robbins has sent me a more detailed report of his case mentioned in the discussion of Hinman's paper.[2] It is as follows:

"Male, fifty-five years of age; carpenter. Family history negative; no history of trauma. Patient had some enlargement of the right side of scrotum; whether due to hydrocele, or enlargement of the testis itself, it was impossible to determine for a period of twenty years. He was tapped several times during the year prior to the operation.

[1] Jour. Amer. Med. Assoc., December 5, 1914. [2] Ibid.

The last time, bloody fluid was obtained, and a rapid increase in the size of the testis was noticed.

Operation January 7, 1909; a large tumor of the testis was removed, the lower part of which was elastic in consistence, and the upper, comparatively hard. The tumor was partly broken down at the time of the operation. Some portion of the healthy testis remained. A rapid, local recurrence followed, and on June 22, fifteen days after the primary operation, a second operation was performed, which consisted in the removal of a large portion of the scrotum on the same side, and the cord as high up as the internal ring, leaving apparently clean normal tissue. One week later, January 28, a well-marked local recurrence appeared, and grew very rapidly. Believing that there was no hope in further operative interference, the patient was put upon the mixed toxins of erysipelas and Bacillus prodigiosus, the dose being carried up to the point of producing severe reactions; temperature of 102° to 103° F. No further growth was noticed, and the recurrent tumor slowly disappeared. The patient was discharged from the Hospital on February 15, 1909, and the injections were continued for some weeks longer, twice a week. He remained in good health for four years, when he developed nephritis, which proved fatal. There was at this time no evidence of any return of his old trouble."

Hertel, of Copenhagen, Denmark (*Hospitalstidende*, April 7, 1909), in a paper upon "The Treatment of Sarcomata with Coley's Fluid" reports 2 cases of inoperable sarcoma, sarcoma of arterioles treated with the mixed toxins of erysipelas and Bacillus prodigiosus. He states that the outcome is highly encouraging for the utilization of these injections in suitable cases. According to his observations, the toxins exert an influence not only upon soft sarcomata, but may also be efficient in the sarcomata of the bones, so that a number of mutilating operations may perhaps be avoided. He will feel obliged in future to employ Coley's fluid in all sarcoma cases which may come under his treat-

ment, even when he feels certain of having removed all sarcomatous tissue in a radical operation.

Male, aged twenty-nine years, upon whom castration had been done at the hospital in 1904, for sarcoma of testicle. A recurrence was observed a year later in the inguinal glands, which were then extirpated. Two years later there again was an extensive recurrence in the same region and a third operation was advised, although the danger and possible uselessness of such procedure were fully appreciated. Lennander's operation was performed and, in the course of the same, infiltrated glands were seen to extend upwards along the iliac vessels, and some of these had to be left behind as they could not be reached. The expected femoral thrombosis did not occur and the wound healed within a month after operation.

In the hope of perhaps influencing the sarcomatous tissue that had been left behind, Hertel, in January, 1908, began the use of the mixed toxins in doses of from 3 to 20 cgr. On March 20, the patient was discharged well and at the time of the report, November, 1908, was presented before the Koege Medical Society in good condition, without a trace of recurrence. A recent letter from Dr. Hertel tells me the patient has removed here.

Hertel's second case was that of a man, aged thirty-nine years, in whom, likewise, the testicle had been removed for sarcoma. A few months later there was a large recurrence in the abdomen, which seemed inoperable. The toxins were begun at once with the result that the nodules became softer and more fluctuating, although the size of the abdomen did not diminish. He grew constantly weaker, developed ileus, and died. Autopsy showed a single large retroperitoneal cyst. Hertel states, if this diagnosis could have been rendered during life, the cyst might have been emptied through a lumbar puncture and the remaining cyst wall could have perhaps been made to disappear through continued treatment with the toxins. There was no trace of recurrence elsewhere.

These two cases of Hertel's offer very strong evidence of the value of the toxins in recurrent sarcoma of the testis even in the presence of extensive involvement of the retroperitoneal glands.

If results like these found not only in my own series of cases, but confirmed by other observers, can be obtained by the use of the toxins it would seem to be much more rational and logical to advise a thorough course of the toxin treatment as a prophylactic immediately after operation, rather than subject all cases to the very grave operation of extensive dissection of the abdominal glands, especially if such an operation is associated with a mortality of 11 per cent.

Trauma. My series shows a definite history of antecedent trauma in 33 per cent. of the cases. This history was so clear and definite in most instances, that it is quite impossible to brush it lightly aside as a mere coincidence, as most writers have done. That antecedent local trauma is a very definite causative factor in the etiology of malignant tumors of all types and in all localities, must be regarded as a well-established fact, and particularly is this true in tumors of the testicle, breast and long bones.[1]

Site of Recurrence. My series of cases shows that recurrence took place in the inguinal region in 6 cases, in the other testicle in 2, in the supraclavicular glands in 2, in the tongue in 1, axillary glands 1, lungs 2, retroperitoneal glands in 42.

These cases show that the statement made by some writers that recurrence is practically always found in the abdominal glands, is not strictly true.

As regards the type of cell, my cases show sarcoma in 47, teratoma in 2, carcinoma in 2, melanotic sarcoma in 1, fibrosarcoma in 1, mixed-celled sarcoma in 1, small round-celled sarcoma in 7.

The following is a brief report of patients who have remained well upward of three years.

[1] For a more detailed discussion of this question see my paper, Injury as a Causative Factor in Cancer, Annals of Surgery, April-May, 1911.

Case I.—Male, aged forty-four years. In 1899, testis was removed at the New York Polyclinic Hospital by Dr. John A. Wyeth. The diagnosis of round-celled sarcoma was confirmed by microscopical examination. One year later the disease recurred in the other testis, and castration was strongly urged by the attending surgeon, but refused by the patient. He was put upon the mixed toxins of erysipelas and Bacillus prodigiosus, the treatment being carried out by Dr. W. J. Robinson of Danville, Va. The tumor very quickly disappeared. Eight years later, I personally examined the patient, and found him in good health, with no trace whatever of a recurrence. He was still well, when last traced, thirteen years later.

Case II.—E. O. T., aged forty-six years. Operated upon February 23, 1906, for a rapidly growing tumor of three months' duration. No history of tuberculosis or specific disease. Pathological report; round-celled sarcoma of extreme malignancy. A personal examination March 22, 1906, showed a small lump, the size of a hazelnut, in the groin, with enlargement of the deep iliac glands. The patient was immediately put upon the mixed toxins, which were continued, three times a week, for seven months, fairly good reactions being obtained. He is still in good health, at the present time, eight years later.

Case III.—J. P. N. L., adult. Operated upon at the Mayo Clinic in November, 1910, for sarcoma of the left testicle. Diagnosis confirmed by microscopical examination. The mixed toxins were started shortly after the operation, and continued by the family physician, Dr. Embree of Gayville, S. D., under my direction, for nearly three months. The patient is in good health at present, with no sign of a recurrence, nearly four years later.

Case IV.—W. M. H., aged twenty-six years. Operated upon February 1, 1906, by Dr. J. E. Simmons, of Omaha, Nebraska, for a rapidly growing tumor of three months' duration. Microscopical examination proved the disease to be round-celled sarcoma. The toxins were started by

me, and later continued by the family physician for about six months. The patient is at present well, with no sign of a recurrence, eight years later.

Case V.—S., aged forty-three years. Operated upon in the summer of 1910, for a rapidly growing tumor of the left testicle, the clinical history and physical signs of which pointed to sarcoma. This diagnosis was confirmed by a number of prominent surgeons. No evidence of tuberculosis; Wassermann negative. About two months later a recurrence took place in the groin, and a second, apparently incomplete, operation was performed in the latter part of August, 1910. One month later, after recovering from the operation, the toxin treatment was started by Dr. Percy Shields of Cincinnati, Ohio, and continued until July, 1911. The largest dose given was ten minims. The patient is in good health at present, four years later.

Case VI.—The following history was given to me by Dr. Wm. Mabon, superintendent of the Manhattan State Hospital: In 1890, patient was operated upon for a tumor of the testicle, which, on microscopic examination, was pronounced sarcoma. Five years later a growth appeared upon the tongue, and increased in size. Extirpation of the tongue was advised by Dr. Mabon, but the patient's family objected so strongly to such a radical operation, that Dr. Mabon decided to try the mixed toxins before excision. Previous to this a section of the tumor was removed by exploratory operation, and submitted to Dr. William H. Welch of Johns Hopkins, who pronounced the trouble round-celled sarcoma. The patient proved very susceptible to the toxins, severe reactions following relatively small doses. The tumor entirely disappeared under the treatment, and, in a letter received from Dr. Mabon, under date of March 5, 1910, he states that he has just heard from the patient's wife, who reports him to be in good health, fifteen years after the treatment was started.

Case VII.—J. D., aged thirty-two years. Referred to the General Memorial Hospital in December, 1908, for an

irreducible scrotal hernia. In addition to a large hernia, we found a large solid tumor the size of a fist, extending up to, but entirely outside of, the hernial sac. Operation: testis removed, which on microscopical examination by Dr. Ewing, was pronounced carcinoma. The patient returned home three weeks later. I examined him personally, on January 31, 1912, at which time he was in good health with no evidence of a return.

Case VIII.—S. C., aged forty-nine years. Operated upon, July, 1906, by Dr. Schoonover, of Yonkers, N. Y., who pronounced the disease round-celled sarcoma. Two months later a recurrence took place in the abdomen, followed by enormous swelling of the leg and thigh. The toxins were then begun under my direction, and almost immediately after, the swelling began to decrease in size. The treatment was continued from December, 1906, to February, 1908, at which time the swelling had almost entirely disappeared. The patient received nearly 200 injections of the toxins. The disease finally recurred, causing death in July, 1909.

Case IX.—P. G., aged fifty-one years, was first seen in consultation by Dr. Lilienthal, in December, 1908. Operation December, 1908, by Dr. Howard Lilienthal, who found the testicle, about the size of a closed fist, occupying a position in the left groin, directly over the aponeurosis of the external oblique, in other words, an inguino-superficial type of undescended testis. Microscopic examination made by Drs. Mandelbaum, Welch, and Ewing, who pronounced the disease round-celled sarcoma. The tumor was removed to a level with the external ring. Two days later the toxins were begun and carried out by Dr. Lilienthal under my direction. The patient is now in good health, December, 1914, or six years thereafter.

Case X.—Dr. D. E. B., aged thirty-seven years. Family history: no syphilis; tuberculosis of lung for past ten years. Two weeks before the first operation, noticed pain in the left hip, together with slight enlargement and tender-

ness in the right iliac region, and over the bladder. He consulted Dr. John B. Murphy, of Chicago, ten days later, who immediately operated and found a tumor the size of a closed fist. As soon as he recovered, he was sent to me for the toxin treatment. (A full history of this case is given in the list of undescended testis cases.)

Case XI.—G. J., aged twenty-seven years. No history of trauma. In April, 1900, first noticed enlargement of the testicle. Operation December 10, 1900, at which time I removed a tumor the size of an orange, which proved to be a typical teratoma of the testicle. A microscopic section had already been reported upon. Patient received the toxin treatment, and when last heard from, three years later, was in good health.

The following is a brief record of my personal cases of *cancer of the undescended testicle:*

Case I.—Dr. D. E. B., aged thirty-seven years. Referred to me by Dr. J. B. Murphy, of Chicago, on July 8, 1908. The left testis had never been in evidence. No specific history. The patient had suffered from tuberculosis of the lung for ten years. The first symptom was dull pain in the region of the left hip; very severe the second night; it then grew less and disappeared. Shortly afterward he noticed a slight enlargement of the left inguinal and iliac region, extending toward the bladder; slight tenderness on pressure. Ten days after the first symptom, he consulted Dr. John B. Murphy, who operated immediately, and found a tumor the size of a closed fist, completely involving an undescended testis. Microscopic examination proved the tumor to be a round-celled sarcoma. As soon as the wound had healed, Dr. Murphy referred the patient to me for the toxin treatment as a prophylactic against recurrence. The entire tumor was sent on and examined by Dr. James Ewing, who confirmed the diagnosis made. The patient was put upon the mixed toxins and proved to be very susceptible, a reaction temperature of 106° F. following a dose of 3 minims. In December, 1908, the old tuber-

cular trouble became active again and the patient went to Wyoming. The toxins were still continued and gradually his general health became greatly improved; his weight was 170 pounds. He remained in good health without sign of recurrence until the latter part of 1911, when symptoms of abdominal recurrence appeared. He died early in March, 1912.

I think it is fair to assume that the toxins used after operation played some part in preventing a return of the disease until three years later.

Case II.—S. B., aged forty-two years. Referred to me November 20, 1906; had always had a right undescended testis; no history of trauma. In the spring of 1906 he noticed enlargement of the undescended testis. Operation was done at the Presbyterian Hospital in June, and the tumor proved to be a sarcoma. A few weeks later numerous tumors appeared in the abdomen, and a second operation was performed in October, by Dr. Wilken of the City Hospital. A vertical incision was made just outside the right rectus and a tumor, the size of a cocoanut, removed. Temporary improvement followed, but a recurrence took place shortly in the shape of a large number of tumors involving the retroperitoneal and mesenteric glands. Physical examination by myself on November 20, showed the patient markedly emaciated and anemic, and in a desperate condition. The toxins were given for a short time, without apparent effect. Death occurred a few months later.

Case of Dr. Maskel Lee, of Wapella, Ill. (Abdominal ectopia.) Spindle-celled sarcoma primary in the undescended testis, involving mesentery, omentum and lower half of kidney.

Case III.—S. C., aged forty-four years; farmer; no history of trauma. This is another example of abdominal ectopia. The first symptom in this case was pain in the left chest, passing down the left side to the groin. There was slight loss of weight. The first examination by Dr. Lee

showed a large tumor, 5½ x 7 inches, extending from the left iliac crest to 1½ inches to the right of the umbilicus; firmly fixed; skin not adherent. Temperature 96° F.; pulse 80; urine highly albuminous; no blood count taken. The patient was sent to a hospital and kept under observation for ten days. The diagnosis of inoperable tumor, probably sarcoma, was made. The patient was then taken to the Rochester Clinic and an exploratory operation was done by Dr. William J. Mayo on March 11, 1913. The abdomen was opened 2 inches to the left of the umbilicus and an immovable tumor was found, starting from an undescended testicle, involving the mesentery, omentum and lower half of left kidney. Microscopical examination proved the tumor a spindle-celled sarcoma. The disease was entirely inoperable and Dr. Mayo advised the mixed toxins. The treatment was begun by Dr. Lee on April 9, under my direction, the doses ranging from ½ to 6 minims, followed by well-marked reactions. After the fifteenth dose, Dr. Lee states:

"There is evidently marked softening with decrease in size and the pain ceased after the sixth injection." After the thirty-second injection, Dr. Lee writes: "The patient's condition is improved in every way; the tumor has diminished in size, softened and loosened; he sleeps and eats well and has gained some weight."

After the sixtieth injection, Dr. Lee writes: "It is now a little over six months since the treatment was begun. The tumor is slowly but surely disappearing. It has decreased in size fully one-third. No pain; gain in weight."

The improvement continued until the early part of November, when he began to have obscure pains in various parts of the body, and rapidly declined until he died on December 4, evidently of general metastases.

Case IV.—I. N. R., aged thirty-five years. This is a further example of abdominal ectopia. No testicle ever noticed on right side. Two years ago, in 1903, he began to have pain in the right inguinal region. He consulted Dr.

J. B. Waterman of New York, who thought it might be due to a hernia and ordered a truss. The truss only aggravated the pain and the patient consulted a Chicago surgeon, who made the diagnosis of appendicitis for which operation was performed on July 28, 1904. An incision was made in the right iliac region and an enlarged testis was found which extended so far toward the median line, that a second incision through the right rectus was made. On microscopic examination the tumor proved to be a teratoma with sarcomatous degeneration. There were no adhesions and the sarcoma part was all within the capsule of the tumor. The patient was referred to me for the toxin treatment, which was begun in September and continued in small doses up to February, 1905, never sufficient to cause any severe reactions. Physical examination January 28, 1905, showed a well-marked induration in the right iliac fossa and a thickening of the scar in the right rectus muscle; the abdomen itself was also somewhat enlarged; his general health was apparently not yet affected. Death occurred within a year.

Sarcoma of the undescended testis; inguinal ectopia; trauma in early childhood.

Case V.—P. G., aged fifty-one years. While playing ball during boyhood, he was struck in the left testicle, which was followed by considerable swelling and inflammation. At this time the testicle retracted into the inguinal region, where it has remained ever since. In 1905 or 1906 he began to have periods of discomfort and pain in the left groin. In the summer of 1907 he noticed enlargement of the testicle which then rapidly increased in size. Operation December 3, 1908, by Dr. Lilienthal, who found the testicle about the size of a closed fist, occupying a position in the left groin, resting upon the aponeurosis of the external oblique, instead of underneath it, pointing to an inguinosuperficial type of maldescent. No communication was found with the abdominal cavity at the operation. The testicle was removed and found to be markedly broken down, resem-

bling very much the caseation of tuberculosis. Microscopic examination, made by Drs. Mandlebaum, Welch and Ewing proved it to be *round-celled sarcoma.* After recovery from the operation, I saw the case in consultation with Dr. Lilienthal and advised the toxins as a prophylactic measure. The treatment was given for several months by Dr. Lilienthal and the patient is in good health at present, nearly six years later.

This, I believe, is the only case of sarcoma of the undescended testis on record, well over three years.

Case VI.—S. W., aged twenty-nine years. Patient had worn a truss for a year five years ago. This caused so much pain, that it was left off. He consulted me in August, 1908, and stated that three years ago he suffered from gonorrhea and prostatitis; the left testicle became swollen shortly after this. Eight months ago he had a second attack of gonorrhea with inflammation of right and left testicle. He complained of a vague feeling of discomfort and pain six months ago, the pain being localized chiefly in the left loin. One month ago a tumor was first noticed in the pelvic region. Operation by Dr. Charles L. Gibson of St. Luke's Hospital, in July, 1908, who found a tumor apparently involving an undescended testis, superficially on the right side, deeply on the left, extending across the whole abdomen and bladder, involving the bladder wall. Microscopic examination showed the tumor to be *carcinoma.* It was the size of two fists and pronounced inoperable.

Case VII.—A. H., aged fifty-five years. (Abdominal ectopia.) Referred to me by Dr. Thomas J. Harris, of New York City, in July, 1913. Operation had been performed in the early part of 1911, by a New York surgeon, for what was believed to be a hernia. At the operation, however, a large tumor was discovered, evidently malignant, occupying the iliac fossa and lower abdominal cavity. It was regarded as too extensive for complete removal. A portion was excised for microscopical examination, and proved to be sarcoma. An attempt later was made by

another surgeon to extirpate the growth, but it was found impossible to remove it entirely. The patient showed temporary improvement for three months, and then began to get worse; pain and hematuria recurred. In July, 1913, he was seen in consultation by myself, and the toxins were advised in the hope of bringing temporary relief. They were given for six weeks in small doses, with little apparent effect. The patient grew rapidly worse and died a few weeks later.

Case VIII.—D. T., aged thirty-one years. Family history negative. Left testis undescended at birth. The patient had noticed enlargement of the left testicle during the year preceding operation, which latter was performed by a prominent surgeon of New York in June, 1909, for a left inguinal hernia and left undescended testis. An attempt was made to bring the latter into the scrotum, but it subsequently retracted into the inguinal region. No other history of injury. In 1910, enlargement of the testicle became apparent and he consulted a surgeon, but was told it was of no significance. There was no pain at any time although the swelling increased rapidly in size, and the patient lost considerable weight. An operation was performed by Dr. Friend, of the Michael Reese Hospital, of Chicago, in June, 1911. The microscopical examination was made by Dr. W. J. Joblin, from whose report I quote:

"From the presence of cartilage cells and two different definite types of tumor, it is very probable that the original growth was a teratoma undergoing malignant change. It may be called a malignant embryoma."

The patient consulted me in July, 1911, but there was already marked evidence of recurrence with extreme emaciation and general metastases, so that I believed the case too far advanced for the use of the toxins. Death occurred shortly afterward.

Case IX.—J. R. S., aged thirty-seven years. Family history good. Double undescended testis since childhood. First operation in June, 1905, at the New York Polyclinic.

Both testes were removed for sarcoma. The right was the size of a goose egg, the left 2 x 3½ inches in diameter. Microscopical examination was made by Dr. Jeffries of the Polyclinic Laboratory. The patient remained well until 1907, when he had an attack of abdominal colic. Similar attacks occurred in 1908–09; pain and indigestion followed and a general falling off in health. In 1911 he had three severe attacks of colic, in 1912, four.

He had very severe pain in the abdomen, which was followed by moderate temperature, 99° to 100° F., and great prostration. A mass, the size of a fist, appeared in the retroperitoneal region; this increased in size, and the patient was brought to me by his brother, a surgeon of the South, in May, 1912.

Physical examination at this time showed the patient considerably emaciated; a large, apparently inoperable tumor could be palpated in the retroperitoneal region. I started the toxins, but gave a hopeless prognosis, believing that nothing more than slight temporary retardation could be expected from the treatment. The latter was carried out by his brother who, under date of June 4, 1912, stated that the patient had gained eight pounds in weight since the treatment was begun, that his color had improved and appetite was splendid and his strength sufficient to enable him to resume his business; there was no perceptible change in the size of the tumor. September 21, 1912, Dr. S. writes "the patient has gained nineteen pounds in weight and his general health is splendid. There is a decided decrease in the size of the inguinal glands; the tumor has diminished in size to some extent and feels softer."

The improvement, as I had predicted, proved temporary only. In the early part of 1913, the patient began to get worse and death occurred on January 27, 1913.

Case X.—B. H., aged twenty-two years. Possible trauma from previous operation, in 1907, done for right undescended testicle and hernia, at another hospital. Testis brought into scrotum; not enlarged at that time. The patient

first noticed enlargement in August, 1908. Operation was immediately performed and the testis found to be sarcomatous. The disease quickly recurred and a third operation was performed in October, 1909. The large mass of glands removed from the groin and iliac region also proved to be sarcoma.

Case XI.—H. W. B., aged thirty years, was referred to me in December, 1906; the left testicle had never descended; patient never wore a truss. In October, 1903, he began to have pain and swelling in the undescended testis. In March, 1904, the tumor, which had then reached the size of a goose egg, was removed by Dr. J. K. Warren of Worcester; the patient at that time had already lost twenty pounds in weight. About one and one-half years later, a recurrent tumor the size of a hen's egg, was noticed in the left groin. The inguinal and iliac glands were also involved. The patient was then referred to me for the toxin treatment which was used for six weeks in conjunction with the *x*-rays, without improvement. The patient died a few months later.

Case of Dr. George H. Walter, Orangeburg, S. C. (Abdominal ectopia.)

Case XII.—Although this case did not come under my personal observation, I was consulted by Dr. Walter in regard to carrying out the treatment. The patient, an adult, had never noticed or felt the left testicle; he had observed a tumor in the left iliac fossa for a number of weeks, causing him continuous pain in the legs and back. The first operation was performed by Dr. A. E. Baker, of Charleston, S. C. A tumor, the size of a cocoanut, partially broken down, was removed. Three weeks later, a second operation was performed by Dr. Walter, who found a large mass in the left side, just below the umbilicus, with cancerous involvement of the glands of the intestine. I advised the use of the toxins in this case, but in a letter dated August 19, 1913, Dr. Walter stated: "The case had too far advanced when the toxins arrived; the patient died three days later."

This case, I believe, is perhaps the most malignant on record. Dr. Walter stated: "The growth developed with extreme rapidity; in five weeks after the removal of the testicle, the mass which appeared in the left side of the abdomen, opposite the umbilicus, had spread until it involved stomach and pancreas down to within an inch of the left hip."

Case XIII.—Since this paper was written, Dr. W. W. Grant of Denver, Colorado, has sent me the history of a very remarkable case of abdominal ectopic testicle. The case had been treated with the toxins for nearly a year, under my direction. The chief point of interest is the fact that when the toxins were begun there was swelling of the legs, and a large inoperable tumor in the abdominal cavity, which became very much smaller under continued treatment. It again increased rapidly in size during a short period of rest from treatment, but as soon as the toxins were renewed it again showed diminution in size, with disappearance of the swelling in the legs.

January 30, 1915, an abdominal incision was made, and the entire tumor was removed without great difficulty. The testicle was plainly observed in the centre of the tumor. Pathological report made by Dr. R. C. Whitman, of Denver (a very competent pathologist), stated, that it was a typical large, round-celled sarcoma; that is, certain portions showed a typical sarcomatous structure, while others had some appearance of the usual carcinoma—again emphasizing the difficulty of classifying these tumors. He was again put upon the toxin treatment after operation. (Note: This case will be reported later in full by Dr. Grant.)

Note.—A full report of the results of the treatment of inoperable sarcoma in general, by the mixed toxins of erysipelas and Bacillus prodigiosus, including those of other surgeons, may be found in the *Transactions* of the Third International Cancer Research Conference, Brussels, 1913.

SARCOMA OF TESTIS.

No.	Age.	Date.	Side.	Antecedent trauma.	Duration.	Testes normal or ectopic.	Type of tumor.	Treatment.	Result.	Final Remarks.
1	26	1906	R.	Yes. Bruise; swelling at once; subsided; returned 3–4 wee s.	Noticed 3 months before operation.	Scrotal.	Sarcoma.	Removal Jan., 1909; mixed toxins (Coley) after operation.	Well 1914, 8 years later.	
2	34	1909	L.	No.	3 months before operation.	Scrotal.	Sarcoma.	Removal Jan., 1909.	Recurred in retroperitoneal region in 6 months.	Death Nov. 30, 1909; total duration of life, 1 year.
3	21	1913	R.	No.	1 month before operation.	Scrotal.	Sarcoma.	Removal Dec. 12, 1913, by Dr. Homer Gage.	Jan., 1913, internal metastasis; rapid decline; toxins for 2 weeks; small doses, but condition so bad, given up.	Died July, 1913; total duration of life, 8 months.
4	25	1912	L.	Yes. Squeezing; injury soon after.	1 year.	Scrotal.	Fibrosarcoma.	Removed in 1910 by Dr. Geo. Ben Johnston.	Recurred in abdomen 2 years later; large abdominal tumor; cachexia, April 10, 1912.	
5	32	1908	L.	No.	?	Scrotal, associated with large hernia not known until hernia operation.	Carcinoma.	Operation, Dec., 1908, W. B. Coley.	In good health Jan. 3, 1912; personal examination.	
6	42	1907	R.	No.	3 months.	Scrotal.	Sarcoma.	Operation Nov. 22, 1907, Dr. Porter, of Boston.	Toxins begun Dec. 10, 1907.	?
7	37	1909	R.	No.	? 5 weeks.	Scrotal.	Sarcoma.	Operation Oct., 1909, by Dr. H. H. Young.	Recurrence in abdomen, 4 months.	Toxins after; large recurrence; little effect; died.
8	42	1901	R.	Yes. 8 months; strain.	8 months.	Scrotal.	Sarcoma; clinical diagnosis.			
9	42	1908	R.	Yes. Horseback at once.	10 months.	Scrotal.	Clinical diagnosis with inoperable metastasis; testes typically sarcomatous.	Case hopelessly inoperable when seen.	No treatment.	Died few weeks later.

10	38	1907	L.	No.	13 months.	Scrotal, size of fist.	Sarcoma.	Operation by Dr. Syms, of Chicago.	2 months later recurred in abdomen.	Oct. 5, 1907, mass size of 2 fists in hypochondriac region.
11	Ad.	1892	R.	No	?	Scrotal.	Sarcoma.	Operation: removal of testis.	Recurred in tongue 5 years later; large tumor; excision of tongue advised by Dr. Wm. Mabon.	Mixed toxins (Coley) given; severe reactions. Entire disappearance; well 15 yrs.; microscopic examination by Dr. Wm. H. Welch.
12	47	1906	R.	No.	3 years.	Scrotal.	Sarcoma.	Operation, 1906; removal of testis.	July, 1906 recurrence; right groin and iliac fossa with infiltration of all neighboring tissues; mixed toxins; marked temporary improvement.	Died.
13	48	1910	L.	No.	Few months.	Scrotal.	Sarcoma.	Operation Sept., 1909.	Recurrence in abdomen few weeks; retroperitoneal glands in six months; treated with mixed toxins; tumor apparently disappeared.	Lost sight of; probable recurrence.
14	55	1902	R.	No.	2 years; painless swelling.	Scrotal.	Round-celled sarcoma.	Operation July 24, 1902.	Recurred in 2 months; local and in groin; second operation.	Rapid recurrence; toxins; slight temporary improvement.
15	46	1906	L.	No.	4 months.	Scrotal.	Round-celled sarcoma.	Operation Feb. 23, 1906.	1 month later apparent recurrence in groin and iliac gland.	Put on mixed toxins; swellings disappeared; patient well May, 1914, 8 years.
16	?	1912	R.	No.	4 months.	Scrotal.	Sarcoma (microscopic examination) Mayo's.	Removal, Feb. 6, 1912.	Toxins after operation under my direction.	Well Dec., 1914, nearly 3 years.
17	37	1908	R.	No.	4 months.	Scrotal.	Sarcoma (microscopic examination).	Operation April, 1907, by Dr. E. Eliot; recurred in 10 months, in abdomen; very extensive, with marked emaciation.	Death shortly after.	

SARCOMA OF TESTIS.

No.	Age.	Date.	Side.	Antecedent trauma.	Duration.	Testes normal or ectopic.	Type of tumor.	Treatment.	Result.	Final Remarks.
18	46	1904	R.	Yes. Injury to right testis; fall on fence rail in childhood.	Slow increase in size 7 years; 4 years tapped and bloody fluid drained off.	Scrotal.	Sarcoma.	Operation, Nov., 1903, by Dr. Lister, of Chillicothe, Ohio.	Recurrence in abdomen 2 months after.	Death within a year.
19	32	1900	R.	No.	5 months; painless lump.	Scrotal.	Sarcoma.	Operation, Nov. 15, 1899, by Dr. B. L. Bangs.	Recurrence in abdomen in 6 weeks; very great pain.	Death in few months.
20	29	1897	L.	Yes. Fall from bicycle Aug., 1896; injured left testis; tumor 2 to 3 weeks after injury.	3 months.	Scrotal.	Sarcoma, melanotic.	First operation by Dr. Millbrook of Albany; 3 operations for recurrence in 9 months. Fourth operation by Dr. Coley September, 1897.	Rapid recurrence; toxins 3 to 4 weeks; no effect.	Death in 3 months.
21	32	1912	L.	Yes. Fell on fence 18 years ago; swelling, which disappeared.	3 months; no pain or tenderness.	Scrotal.	Sarcoma, small round-celled.	Operation, Oct. 7, 1912, by Dr. Kimball.	Toxins after operation.	Well July, 1914.
22	26	1908	R.	No.	6 to 7 months; painless enlargement.	Scrotal.	Sarcoma.	D. W. Wood, Nov., 1907.	Recurrence in abdomen 5 months.	Death.
23	42	1904	R.	Yes. Injury to left testis getting out of bath tub, April, 1903. Swelling noticed 3 months later.	4 months.	Scrotal.	Teratoma	First operation, by Dr. Chetwood, Oct. 8, 1903; recurred Jan. 1, 1904. Second operation Jan. 28, 1904, by Dr. Coley.	Toxins for 2 months; little effect.	Died Oct., 1904.
24	28	1899	R.	Yes. Fall from bicycle; injured right testis.	1 year.	Scrotal.	Sarcoma, microscopic examination.	Operation, Dec., 1898, by Sir Alfred Fripp.	Recurrence in abdomen 3 months later.	Mixed toxins 6 months; slight but temporary improvement; death in 1 year.
25	28	1911	L.	Yes. Struck with baseball; severe pain 4 days; tumor 8 weeks.	5 months.	Scrotal.	Sarcoma. Mayo's laboratory.	Operation, Dec. 2, 1910, Mayo's clinic	Toxins after operation for 1 year	In good health 1 year later

25	28	1911	L.	Yes. Struck with baseball; severe pain 4 days; tumor 8 weeks.	5 months.	Scrotal.	Sarcoma. Mayo's laboratory.	Operation, Dec. 2, 1910, Mayo's clinic.	Toxins after operation for 1 year.	In good health 1 year later.
26	32	1910	L.	No.	6 months.	Scrotal.	Sarcoma.	Operation, July, 1910.	Symptoms of abdominal recurrence 2 to 3 weeks after operation.	Sept., 1910, very large abdominal tumor; size of child's head; toxins given; little effect; died Oct. 10, 1910.
27	49	1907	L.	Yes. Fell astride board 14 years before; injured left testicle.	2 years.	Scrotal.	Sarcoma.	Operation, July, 1906, by Dr. Schoonover.	Recurrence in abdomen and iliac fossa in 2 months; enormous swelling of leg and thigh; toxins given.	Almost complete disappearance of tumor and swelling; toxins given from Dec., 1906 to March, 1908, when tumor had apparently disappeared; recurrence and death July, 1909.
28	33	1895	L.	No.	2 months.	Scrotal.	Sarcoma.	Operation, Mar., 1893, by Dr. A. T. Cabot.	Recurred in abdomen 2 years later.	Toxins, 2 weeks, no effect; death shortly after.
29	28	1906	L.	Yes. Injured testis riding 6 years before.	3 months.	Scrotal.	Sarcoma.	Operation, May, 1906, by Dr. Torek.	Recurrence local; 2 months; second operation.	Metastasis supraclavicular and abdominal glands; 2 doses of toxins ♏¼; no reaction; died 3 days later, probably embolism.
30	Ad.	1906	R.	?	?	Scrotal.	Sarcoma.	Operation, Oct., 1904, by Dr. Chas. Stewart.	Recurrence in abdomen 1 year later.	Jan., 1906, toxins ♏ 1 to 15 caused cessation of pain & growth checked; death.
31	31	1904	R.	Yes. Kicked in right testis; enlargement noticed 2 years later.	5½ years.	Scrotal.	Sarcoma.	Operation, Nov., 1906; metastasis in abdomen before testis removed.	Rapid loss in flesh and strength.	Died shortly after.
32	22	1911	L.	No. Gonorrhœa 6 months before.	2 months.	Scrotal.	Sarcoma, mixed-celled.	Exploratory laparotomy, July, 1911; removal of some retroperitoneal glands by Dr. A. A. Berg.	Aug. 29, 1911, left testis size of 2 fists; large tumor in abdomen.	Death.

SARCOMA OF TESTIS.

No.	Age.	Date.	Side.	Antecedent trauma.	Duration.	Testes normal or ectopic.	Type of tumor.	Treatment.	Result.	Final Remarks.
33	22	1897	L.	Yes. Fell from bicycle and injured left testicle; enlargement soon after.	Few months.	Scrotal.	Sarcoma.	Operation, Aug., 1896, Lenhardt.	Local recurrence 6 months. Second operation, June, 1897.	Abdominal recurrence soon; death Oct., 1897.
34	28	1901	?	No.	2 years; painless enlargement.	Scrotal.	Sarcoma.	First operation Dec., 1899, by Dr. DeGomo; recurrence 9 months in glands, in groin, and in abdomen.	Rapid decline.	Death.
35	38	1900	L.	No.	4 years.	Scrotal.	Sarcoma.	Operation, July, 1899; recurrence in abdomen.	1 year later; severe lumbar pain.	Swelling in left leg; toxins marked; improvement temporary.
36	32	1902	L.	No.	22 years; increase in size only 8 months	Scrotal.	Sarcoma.	Operation, April 2, 1902, by Dr. Coley.	?	
37	27	1900	R.	No.	9 months.	Scrotal.	Teratoma.	Operation, Dec. 12, 1900, by Dr. Coley.	Patient in good health 3 years later.	
38	?	1898	R.	Yes. Kicked in right testis by horse 2 years ago; small tumor. Second injury 4 mos. ago.	4 months.	Scrotal.	Sarcoma, round-celled.	Operation, Aug. 11, 1898.	Recurred in abdomen.	Death in 1 year.
39	35	1910	R.	No.	1 year.	Scrotal.	Sarcoma, round-celled.	Operation, May 3, 1910.	Recurred in abdomen; toxins for several months.	Death in 1 year after operation.
40	30	1906	R.	Yes. 15 years ago fell and injured right testis; 10 yrs. ago second injury.	1 year.	Scrotal.	Sarcoma.	Operation, Aug., 1906, by Dr. Deaver.	Recurred in abdomen in 6 months.	Death.
41	22	1909	R.	Yes.	6 months.	Scrotal.	Sarcoma.	No operation; hopeless when first seen.	Recurred in retroperitoneal glands.	Died a few months later; duration of life less than 1 year.
42	24	1904	R.	Yes. Blow Dec., 1901; swelling at once.	9 months.	Scrotal.	Sarcoma.	Operation, Aug., 1902.	Recurred 6 months axillary glands, ribs and lung.	Died July 25, 1903.

43	35	1914	?	No.	6 months.	Scrotal.	Sarcoma.	Operation, 1910; by Dr. Johnston, of Richmond.	Recurred 2½ years later in abdomen and supraclavicular glands.	May, 1914, inoperable; toxins tried; marked improvement.
44	32	1906	?	No.	3 years, then sudden increase in size.	Scrotal size of grape-fruit.	Sarcoma.	Operation, Jan., 1906.		
45	23	1907	R.	No. First noticed March, 1906.	2 months.	Scrotal.	Sarcoma.	Operation, June, 1906, by Dr. J. Stanley Brown.	Recurred in 8 months in retroperitoneal glands; toxins short while; no effect.	Death 11 months later, March, 1908; total duration of life, 2 years.
46	19	1896	L.	No.	1 year.	Scrotal.	Sarcoma.	Operation, Jan., 1896, by Dr. Chas. McBurney.	Large mass in iliac fossa at time of removal of testis.	Grew rapidly worse; death 2 months later.
47	Ad.	1910	L.	?	?	Scrotal.	Sarcoma.	Operation, Nov. 5, 1910 (Mayo's clinic).	Toxins begun under my direction; Dec., 1910, as prophylactic.	Patient in good health over 3 years.
48	45	1913	L.	No	Noticed first early 1910; 6 months before operation.	Scrotal.	Sarcoma, small round-celled.	Operation, Jan., 1911, by Dr. Williams.	Recurrence in 1912, in abdomen; toxins begun Sept., 1912; small doses ¼ to ½ minim.	Third operation Feb. 31, 1913, abdominal operation; found large inoperable retroperitoneal tumors; not traced.
49	48	1908	L.	Yes. Horseback injury July, 1907; swelling at once.	No operation; loss, 50 lbs. weight 1 year later.	Scrotal.	Sarcoma.	No operation.	Had large inoperable metastasis in abdomen when first consulted surgeon; no glands in groin.	Toxins short time little effect; death 1½ years from first symptoms.
50	28	1910	L.	No.	July, 1910, first noticed; in 3 months size of fist.	Scrotal.	Sarcoma.	Operation, Sept. 23, 1910, by Dr. Donovan, Lewiston, Md.	Dec., 1910, recurrence in groin and retroperitoneal glands.	Mixed toxins begun Dec. 16, 1910, Dr. Coley. Marked improvement; May 1, 1911; still improving.
51	28	1914	L.	No.	Tumor 2 months before operation; no pain.	Scrotal.	Mixed-celled sarcoma.	First operation, Dec., 1912.	Well 2 years, then recurs in supraclavicular glands and lung; no involvement of abdominal glands.	Removal of glands by operation; fulguration; mixed toxins; still under treatment.
52	52	1914	R.	No.	Noticed 1 month before operation.	Scrotal.	Round-celled sarcoma.	Operation, Feb., 1914.	Abdominal recurrence 3 months later; very large abdominal tumors, Nov., 1914.	Mixed toxins Nov., 1914, 2 months marked improvement; temporary metastasis in lung.

SARCOMA OF UNDESCENDED TESTIS

No.	Age.	Date.	Side.	Antecedent trauma.	Duration.	Testes normal or ectopic.	Type of tumor.	Treatment.	Result.	Final Remarks.
53	37	1908	L.	No. Tuberculosis left lung 10 years.	Operation, 10 days after first symptoms (pain).	Abdominal ectopia.	Round-celled sarcoma.	Operation, June 11, 1908, by Dr. John B. Murphy; size of fist.	Toxins begun July 8, 1908, by Dr. Coley; continued at home.	Well over 3 years, then died of recurrence; duration of life, 3½ years.
54	42	1906	R.	No.	Operation 2 months after first noted, June, 1906.	Abdominal. ?	?	Presbyterian hospital, N. Y.	Few weeks later multiple recurrence in abdomen; Nov., 1906, markedly emaciated and cachectic.	Death few weeks later; duration of disease 9 months.
55	30	1903	R.	No. (No truss.)	Operation 6 months after first symptoms.	Inguinal canal.	?	Operation, Mar., 1904, by Dr. J. K. Warren, Worcester.	Recurrence in groin 1½ years later; also in iliac glands.	Toxins 6 weeks and X-rays; no improvement; death Feb., 1907.
56	22	1908	R.	Yes. Possible trauma operation undescended testis and hernia 1 year before.	First noticed Aug., 1908; operation at once.	Inguinal.	Operation, 1908.	Recurred in few weeks in groin and iliac fossa.	Third operation.	Death in less than a year.
57	33	1912	D.	No.	Operation, June, 1905.	Abdominal; double.	Round-celled sarcoma.	Both testes removed by Dr. Wyeth, June, 1905.	Well 2 years, then attack of abdominal colic; recurrence.	Toxins begun May, 1912. Marked improvement continued 6 months. Died January 27, 1913.
58	31	1911	L.	Yes. Operation for undescended testis and hernia year before.	Tumor 2 to 3 months before operation.	Inguinal.	Teratoma type.	Operation, June, 1911, Dr. Friend (Chicago).	July, 1911, 1 month later; abdominal recurrence; extreme emaciation.	Death few weeks later. Duration of disease less than 6 months.
59	55	1913	R.	No trauma.	Inoperable when discovered.	Abdominal.	Sarcoma.	Exploratory laparotomy, Feb., 1911.	Second operation: partial removal; hæmaturia.	Rapid growth; toxins, July, 1913, 6 weeks; no effect; death few weeks later.
60	29	1908	L.	Had worn truss 5 years ago; gonorrhœa 8 months before.	Tumor noticed 1 month before operation.	Inguinal.	Carcinoma.	Exploratory operation July, 1908, by Dr. C. L. Gibson.	Tumor found inoperable; bladder involved.	Death shortly after.

61	51	1908	L.	Injury in childhood.	Tumor 1 year before operation.	Inguinal: size of closed fist.	Sarcoma, round-celled.	Operation, Dec. 3, 1908, by Dr. Lilienthal.	Toxins, 3 to 4 months as prophylactic.	Patient well July, 1914, 6 years later.
62	35	1903	R.	No injury.	Supposed to be appendicitis.	Abdominal.	Teratoma with sarcomatous degeneration.	Operation, July 28, 1904.	Toxins begun 2 months after operation as prophylactic continued 4 months.	Abdominal recurrence 4 months after operation.
63	44	1913	L.	No.	Clinical diagnosis; inoperable tumor of abdomen.	Abdominal.	Spindle-celled sarcoma.	Exploratory operation, March, 1913; large inoperable tumor of undescended testis.	Mesentery, omentum, left kidney involved.	Toxins 6 months, marked decrease in size; ½ increase in weight; Nov., 1913, worse: death Dec. 4, 1913.
64	Ad.	1913	L.	No. Never fell.	Inoperable tumor.	Abdominal.		First operation, July, 1913; tumor size of cocoanut removed; 3 weeks later second operation.	Impossible to remove tumor at second operation.	Extremely rapid growth; entire course of disease less than 3 months.

DISCUSSION

Dr. W. R. Jackson, Mobile, Alabama.—This paper is a very interesting one and filled with much original work, and I cannot let it go by without thanking the author for it.

I would like to ask him what his experience has been, aside from the use of the toxins, with radium, radiant energy, the *x*-ray, or the violet rays in the treatment of sarcoma? Also, he omits to say what he did with recurrent growths, and whether the recurrence is local or metastatic.

I have had some experience with sacroma or, as the author prefers to name it, cancer as a general term, inasmuch as the histologic classification is uncertain, and my experience has been that all patients operated on die within two years.

Dr. Bransford Lewis, St. Louis, Missouri.—I have not had sufficient experience with this subject to justify me in speaking from that standpoint, although I have observed certain cases. It is evident from this excellent contribution that certain deductions may be made, namely, that we are almost hopeless in our position as surgeons in attacking a disease like cancer when it is well established, so that we ought to attack the problem before that time, and before the undescended testis becomes a subject of carcinoma of any sort it ought to be attended to, by replacement in the scrotum, if possible, or early removal if undergoing tumefaction. These testicles are practically useless so far as functional activity is concerned. They do not contribute spermatozoa to amount to anything. If there is a good testis that does all the work, and the other is a standing invitation for disturbances, such as Dr. Coley has described, our surgery, whatever it be, should be undertaken early in the game rather than wait until operation becomes of no avail.

An important feature about the cause for the seriousness of this situation is the lymphatic connections. The lymphatics of the testis are connected directly with the pelvic glands and not the inguinal glands. When there is recurrence in a case of carcinoma of the penis, for instance, the inguinal region is involved, but the testicle being connected with the iliac glands, that is where the recurrence takes place under these circumstances.

Dr. Battle Malone, Memphis, Tennessee.—Dr. Lewis spoke of the proportion of cases of cancer of the testis to the

total number of cases observed, but I did not catch the point he made as to what proportion of undescended testicles he has observed became cancerous. I do not think from the information we have that any larger proportion of undescended testicles become cancerous than other testicles, and for that reason, when the testicle can be brought down into the scrotum, it should be done. Especially is that true in double cryptorchids.

A case came under my care several years ago where the operation of bringing both testicles down into the scrotum had a remarkable psychological effect upon the patient. He was ashamed of his condition until the operation was performed, and it made the greatest difference to his individuality. It has been my practice to bring the testicles down and fix them in the scrotum.

Dr. Joseph Ransohoff, Cincinnati, Ohio.—Dr. Coley touched upon one of the most important side issues in connection with the management of undescended testicle. I have seen but one case of malignant disease of the testicle where it was not undescended, but rather an intramural one. That case was a most interesting one because the brother of the patient likewise had an undescended testicle, and notwithstanding all efforts I made to have him consent for me to do an operation, he persistently refused.

The question is whether the intra-abdominal testicle, one that is not intramural, is in reality a testicle that is functionally without value. Personally, I doubt very much indeed whether that is true.

You all know perhaps about the horrible case of Sir Astley Cooper in which a student came to him with an undescended testicle on each side, and asked him whether it was possible for him to impregnate his wife so as to have children. Sir Astley Cooper said no. The man committed suicide promptly, and the autopsy revealed two well developed testicles intra-abdominally.

The question is whether a testicle that cannot by operation be brought down into the scrotum may assume approximately the normal position. I have one or two cases I am watching with interest. I thought I brought the testicles down as far as they could be brought down, but they have mounted again, and are fixed near the abdomino-inguinal canal. I am watching these cases with interest. In one of them I have asked the patient to remove the testicle but he has declined. If it does

not develop as it should develop, the question is whether to return the testicle into the abdominal cavity and leave it intra-abdominal rather than attempt to bring it down if it is of fair size. If it is not of fair size, the right thing, it seems to me, is to remove it, provided there is one on the other side.

The proper treatment of these cases is whether the testicle should be brought down, or whether it should be removed, or whether it should be put back into the abdominal cavity, and what influence the undescended gland has upon the development of malignant disease later on.

Dr. Coley (closing the discussion).—The discussion has brought out some important points. In regard to what Dr. Jackson has said with reference to my experience with the *x*-ray and radium, or radio-active agents in the treatment of sarcoma of the testis, I must say that I have never seen any striking improvement follow the use of the *x*-ray in these recurrent abdominal masses in sarcoma of the testis. I have never seen radium used at all, and there is no case reported to my knowledge in which radium and the *x*-ray have brought about anything but temporary benefit in sarcoma of the testis.

I did not have time to say in my paper what the results have been in the recurrent cases. I will go over briefly the cases which remained well for three years. (Reading from paper.)

The most remarkable case is that of the recurrence of a large tumor in the iliac fossa and abdominal glands, with enormous swelling of the thigh and legs in which the toxins caused the tumor to disappear entirely. The toxins were used for a period of two years. The patient died at the end of three years of recurrence. This is the most striking case of any I have ever seen.

There is one case which Dr. Robinson, of Danville, Virginia, took to Dr. Wyeth, of New York, who removed a sarcoma of the testicle (small round celled). The following year recurrence took place in the other testicle. The patient refused to have the other testicle removed, and the mass disappeared under four months' treatment and toxins. I examined him and found him in good health with no trace of recurrence eight years later, and he was well when I last heard from him several years thereafter.

As regards the question brought out by Dr. Ransohoff of what to do with the undescended testicle, I am strongly opposed to the view held that we should remove every undescended

testicle. My experience with undescended testis in connection with the operative treatment comprises something over 200 cases. I do not remember the exact proportion of abdominal ectopia, but in only one case have I found the abdominal testicle so strongly fixed as to be unable to place the testicle in the scrotum. I removed the testis in this case as the patient was an adult and had a sound testicle on the other side. The only other instance in which I removed the testis was in a very large inguinoperineal hernia; the testis was very small and of no value.

We have nearly 200 cases on record at the Hospital for the Ruptured and Crippled done by other men, who have never found it necessary to remove the testicle.

As regards the functional value of these testicles, everybody believed they have no functional value, but Rowlings a few years ago analyzed the St. Bartholomew's Hospital cases, 120 cases operated on in his hospital by different men, and to the surprise of most surgeons, most of them were found to be of functional value, which is in harmony with the opinion Dr. Ransohoff brought out. When an undescended testicle at the age of puberty is associated with hernia it should be operated on, following out the technique described by Dr. Bevan, which can nearly always be carried out. In these cases, if the testicle cannot be brought down into the scrotum, it should not be put back into the abdominal cavity but removed. The objection to putting it back into the abdominal cavity is that the abdominal testis is more liable to the development of malignant disease than any other. Formerly, I did not believe in the theory that an undescended testicle is any more liable to malignant disease than the normal testicle, but further clinical experience has convinced me that I was in error, and I think the facts at present warrant the opinion that malignant disease is relatively more frequent in the undescended testis than in the normally descended testis.

THE SIMPLICITY OF BLOOD TRANSFUSION, BY MEANS OF THE KIMPTON-BROWN TUBES

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Simplicity should characterize all surgical procedures, and is particularly demanded in operations which have to deal with emergencies.

In recent years the efficacy of blood transfusion has been abundantly proven, and the surgical world cheerfully acknowledges its debt to Crile for his work in establishing this ancient therapeutic measure on a scientific, practical, and safe basis.

Transfusion has been performed by a number of different technical methods, among which may be mentioned: first, end to end suture of vessels of donor and recipient, with or without mechanical aid after the manner of Carrel[1] and Horsely[2]; second, end to end anastomosis by means of a canula, such as that of Crile, Elsberg or Soresi; third, indirect anastomosis through the intervention of glass or metal tubes, or rubber bulbs, after the manner of Brewer,[3] Bernheim,[4] and McGrath[5]; fourth, indirect transfusion by the withdrawal of blood from the vessels of the donor into a suitable receptacle and its injection into the circulation of the recipient.

Indirect transfusion may be subdivided into two important methods:

(*a*) The syringe canula methods of Lindeman,[6] Crotti,[7] and others; and

(*b*) The paraffinized glass tube method as practised by David and Curtis,[8] Satterlee and Hooker,[9 11] and particularly by Kimpton and Brown, by means of the instrument first described by them in the Journal of the American Medical Association, July 12, 1913.[1]

I have no adverse criticism to offer concerning any of the methods of transfusion in present use, further than to say that some of them, particularly the end to end anastomosis of the vessels of donor and recipient, either by suture, canula, or other mechanical aid, have proven rather too tedious and difficult of execution, and rather too uncertain in results for the operation to have attained that general usage to which its great value as a therapeutic agent entitles it. I would especially commend to the attention of those interested in transfusion the instrument devised by David and Curtis.[8] Their method presents some ingenious and valuable features, but is hardly so simple as the one under discussion.

Without going into the details of the different operations for transfusion which have been heretofore brought forward, I desire to present to your attention the Kimpton-Brown tube, and to describe the technique of transfusion by this method.

The special instruments consist of the Kimpton-Brown tube and an ordinary cautery bulb. The tubes are of two sizes and are graduated up to 100 c.c. and 250 c.c. respectively (Fig. 1).

Other instruments needed (Fig. 2) are such knives, scissors, tissue and artery forceps, needles and sutures as may be necessary to expose the veins of the donor and recipient. A fine, sharp knife, such as a cataract knife, is best used for opening the veins; and mosquito clamps, fine hooks, or very small forceps should be on hand for catching and steadying the exposed veins. If more than one tube is to be filled, it is well to have a few Crile clamps to temporarily occlude the vessels while the change to second tube is being

made. A hypodermic syringe for injection of the local anesthetic is also essential.

The safety and success of the operation depends upon the proper preparation of the tube. This is simple, and consists in giving it a uniform coating of paraffin over its entire inner surface.

This is accomplished by placing in the tube about 1 cu. in. of paraffin, wrapping the tube in a towel and sterilizing it in the autoclave.

When the tube is removed from the autoclave and allowed to cool somewhat, it may be gently rotated under aseptic precautions until the entire inner surface is coated with the liquid paraffin, which quickly hardens, the excess being allowed to run out before solidification has taken place. It is then wrapped in a sterile towel, protected from injury by cotton, and laid inside until needed.

Another way is to let the entire mass of paraffin solidify in the tube, and when ready to use, heat the tube over an alcohol lamp or gas flame until the paraffin is melted, when the uniform coating is obtained and the excess drained off.

After placing a small piece of sterile cotton in the outer end of the side tube, for filtration of the air, the tube is ready for use.

Under local anesthesia, a vein at the bend of the elbow of the donor is exposed and freed for a distance of 1 to 1½ inches, and a vein in the arm, or any other superficial vein, of the recipient is similarly exposed.

A ligature is placed around the vein of the donor and tightened or tied proximally (Fig. 3).

Traction is made on this ligature, which elevates the vein, and it is opened longitudinally with the cataract knife. The edges of the incision in the vessel are held apart by the assistant with mosquito forceps, fine hooks, or small tissue forceps and the tip of the tube, directed to the periphery is inserted into the lumen of the vein (Fig. 3).

The donor is directed to open and close his hand slowly, and the pumping effect thus brought about will fill the larger tube in from one to three minutes. Constriction around the upper arm is not usually necessary but will accelerate the flow of blood. When full, the tube is quickly withdrawn and turned on its side in such a manner that the tip of the tube and the end of the side tube are uppermost (Fig. 5). These are so placed that when held in the manner illustrated in Fig. 5, no blood will escape from the completely filled tube.

As the tube is withdrawn the vein is clamped temporarily for further use, or left to an assistant for closure if no more blood is desired.

The vein of the recipient is treated exactly as that of the donor, except that it is ligated distally, and, when opened, the tip of the tube is directed centrally (Fig. 6).

The cautery bulb, previously sterilized, is attached to the side tube, very slight pressure is exerted, and the blood flows into the vessels of the recipient at a rate which is always under control.

If more blood is desired, the operation is repeated with a fresh tube, otherwise nothing remains to be done except to close the small wounds made in exposing the veins.

The entire operation is quickly performed, and, if the tube has been properly prepared and there is no undue delay in transferring the blood from donor to recipient, there will be no coagulation.

If Vincent's mixture (consisting of: paraffin, two parts; vaseline, two parts; stearin, one part) or a paraffin of a low melting point has been used, the tube is quickly cleansed by running hot water through it, after which the moisture should be removed with alcohol and ether.

A few minor but important points in technique should be borne in mind.

1. In transferring the tube, the thumb should be placed over the cork and one finger should be placed over the

end of the side tube as illustrated in Fig. 5. Kingston places two fingers on the cork and his thumb over the side tube, which accomplishes the same purpose. It is never necessary to touch the tip of the tube.

2. When the blood is being injected into the vein of the recipient, the thumb pressure on the cork should be constantly maintained, as in Fig. 7, else it might be forced out of the tube.

If this should occur, the palm of the hand placed over the end of the tube will effectually close it and allow the transfusion to proceed.

3. The transfusion should be stopped before the last few cubic centimeters of blood have escaped, as the entrance of air into the vein is thereby avoided.

The experimental work for the perfection of this tube and the development of the operation was carried on by Kimpton and Brown in the Department of Comparative Pathology of Harvard University.[10] It has now passed far beyond the experimental stage.

In a personal letter, Dr. Kimpton tells me that he has used it successfully in more than forty cases; that it is used in all the Boston hospitals; and that it is used exclusively in Cushing's Clinic, where over fifty successful transfusions have been performed. Our experience with it in Birmingham has been uniformly favorable. It has been used by different surgeons who have become familiar with its advantages, in twenty-three cases that I know of, a number of these being in my own hands. The oldest of my patients was a man seventy-eight years of age, and the youngest a baby of five months.

I have recently noticed the criticisms of this method of transfusion by Bernheim and Jones, in which they say:

"The disadvantages are rather formidable." One of the disadvantages they mention being that the vessels of the donor and recipient must be exposed by incision, and prepared with great care in order to prevent clotting and failure

Fig. 1.—The Kimpton-Brown tubes; two sizes, 100 c.cm. and 250 c.cm. Cautery bulb.

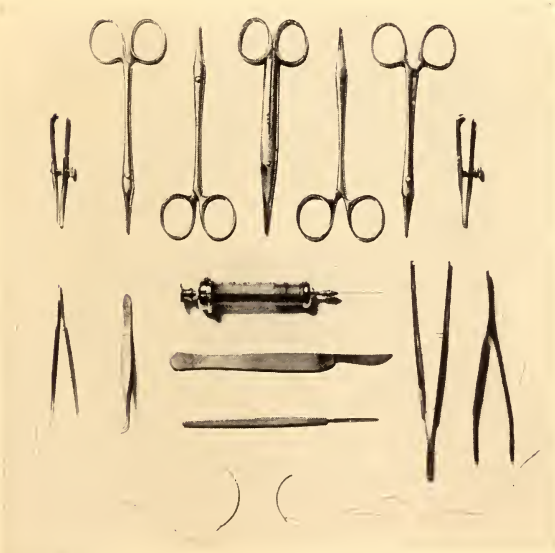

Fig. 2.—Instruments necessary for performing transfusion with Kimpton-Brown tube.

Fig. 3.—Donor's vein exposed, ligated centrally, and tube ready to be introduced into vein, the tip directed peripherally.

Fig. 4.—Tube in donor's vein and blood flowing into the tube.

Fig. 5.—Proper method of holding the tube while transporting blood from donor to recipient.

Fig. 6.—Recipient's vein exposed, ligated distally, and tube filled with blood ready for introduction into vein, the tip of the tube directed centrally.

Fig. 7.—Tube in position, the bulb attached, and the blood being slowly forced into the vein of the recipient.

of the blood to flow; the other being the bulky, awkward glass cylinder, which will occasionally break.[12]

The incisions required do not differ in character or extent from those employed in suture or canula methods, and the preparation of the vessels is simpler. I do not consider exposure of the veins a serious drawback. It is a matter of no moment to donor or recipient in the presence of acute hemorrhage or other emergency, and will be readily assented to in any chronic condition where transfusion is indicated.

This operation has a distinct advantage over the anastomosis methods in that if clotting occurs, it is immediately detected. That the size of the tube has not been a drawback is attested by the extensive use that has been made of the method wherever it has been introduced.

The coating of the tube with paraffin presents no difficulties, and the accidental breaking of the glass can only be guarded against by using such care as an operation of this importance demands.

I believe more successful transfusions will be performed when the veins are exposed and opened than when punctured through the skin with canula or needle, therefore, I do not favor the modification Bernheim and Jones suggest, that of attaching a Lindeman canula to the tip of the tube.

While the last word has not been said concerning either the technic of transfusion or its many other problems, I consider the Kimpton-Brown technique the simplest and surest method yet devised, and one that may be used by the surgeon with perfect safety in the hospital or in the home.

A wider acquaintance with its advantages should result in a great broadening of the field of successful transfusion.

References.

1. Carrel, Alexis. Keene's Surgery, v, 133–135.

2. Horsley, J. Shelton. Surgery, Gynecology and Obstetrics, xviii, No. 5, 536–545.

3. Brewer. Jour. Amer. Med. Assoc., January 30, 1909.

4. Bernheim, B. M. Surgery of the Vascular System, 15–17.

5. McGrath. Surgery, Gynecology and Obstetrics, 1914, xviii, 376.

6. Lindeman. Amer. Jour. Diseases of Children, July, 1913, vi, 28.

7. Crotti. Surgery, Gynecology and Obstetrics, 1914, xviii, 236.

8. David and Curtis. Jour. Amer. Med. Assoc., lxii, No. 10, 775–776.

9. Satterlee and Hooker. Archives, Internal Medicine, January, 1914, xiii, No. 1.

10. Kimpton and Brown. Jour. Amer. Med. Assoc., lxi, No. 2, 117–118.

11. Satterlee and Hooker. Surgery, Gynecology and Obstetrics, xix, No. 2, 235–241.

12. Bernheim and Jones. Jour. Southern Med. Assoc., vii, No. 11, 869–875.

A NEW METHOD OF LATERAL ANASTOMOSIS OF BLOODVESSELS AND AN OPERATION FOR THE CURE OF ARTERIOVENOUS ANEURYSM

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Lateral anastomosis of bloodvessels is used either in uniting a vein to a vein, as in the Eck fistula when the portal vein is joined to the vena cava, or in uniting an artery to a vein in order to reverse the circulation. The indications for Eck fistula are few, if any, so far as its clinical application is concerned. The operation was described by Eck, a Russian surgeon, in 1877 and again in 1879. It has been performed a few times by German surgeons in cirrhosis of the liver,[1] but the metabolic products from the portal circulation sooner or later produce a toxic effect when discharged into the general circulation at a rate as great as the Eck fistula permits. Again, it is possible that the ascites may be due to irritation of the peritoneum and not solely to portal obstruction.

The indications for reversal of the circulation are still under much dispute. Halstead and Vaughan[2] reviewed the literature and reported personal experiences. They conclude that the operation for reversal of the circulation has no practical value. Coenen, of Breslau, opposes the operation and gives his reasons at some length. They are

[1] Rosenstein, German Surgical Congress, 1912.
[2] Surgery, Gynecology, and Obstetrics, January, 1912.

that the valves must be forced, that it is probable the arterial blood following the route of least resistance goes through the first anastomotic veins back to the heart and rarely if ever reaches the terminal branches of the vein, that in arteriovenous aneurysm it takes weeks and sometimes months for valves to be forced sufficiently to detect pulsation in the smaller veins, and that the arterial blood in venous capillaries must have some manner of return which has not yet been fully studied. There are many pathological conditions in man such as arteriosclerosis, thrombo-angeitis obliterans, diabetes, and Raynaud's disease that do not occur in experimental work. When the vessel itself is diseased at the site of the anastomosis, or when the veins are involved in the disease, reversal of the circulation is useless. When gangrene has already occurred, of course, operation for reversing the circulation cannot bring relief.

The practical utility of reversal of the circulation is doubtful. Some experiments which I have recently performed and which are not yet ready for full report seem to show that in reversal of the circulation the blood returns to the heart by anastomotic venous branches a short distance below the site of the operation and that the arterial blood in a reversed femoral vein never reaches the foot and usually goes but little below the knee.

If the circulation is to be reversed, it should be done by lateral anastomosis and not by an end-to-end union. When the vein and artery are both cut across and the artery united to the vein end-to-end, the remaining channel of the artery is sacrificed, whereas if lateral anastomosis is performed and the vein ligated on the cardiac side, there will be two channels for the arterial blood instead of one. The original arterial channel is not put out of commission and at least no harm will be done even if no good is accomplished. This was originally pointed out by J. B. Murphy and has later been demonstrated and insisted upon by Bernheim and others.

When the main artery to a limb is partially occluded and the veins are healthy, the arterial blood in the capillaries is probably drained off more quickly than normal. Thus the tissues are not bathed with arterial blood sufficiently long to be nourished properly. Obstructing a large vein may prevent this rapid passage of arterial blood and so equalize the circulation and improve the condition of the limb. In this way may be explained some of the reported improvements that have followed reversal of the circulation in a limb, particularly after the end-to-end method.

When doing a lateral anastomosis of artery and vein, Bernheim and Stone[1] recommend making the opening in the vessels by transfixing them with a cataract knife, and cutting from within out about one-third of the circumference. The vessels are then cleaned with either normal salt or Ringer's solution, annointed with liquid vaseline, and united by a continuous suture of fine silk.

Bernheim and Boegtlin[2] discuss the question of whether an Eck fistula is compatible with life, and describe a new method of making this fistula. The portal vein and vena cava are first sewed together with a small curved needle and silk, using a continuous suture and No. 3 curved, French intestinal needle with double thread. Another row of sutures is made parallel with this, and an especially constructed scissors with sharp points is partly opened, one blade plunged into the vena cava, and the other into the portal vein. The partition is then cut. A previously inserted suture is quickly tied at the point of the puncture of the scissors. They claim that Eck fistula in dogs is consistent with life for a long period of time provided the diet is regulated, though certain hepatic functions are decreased when an Eck fistula is present, notably, tolerance for sugars, the formation of bile, and the hemolytic function of the liver.

The technique of Bernheim is similar to that of Sweet,

[1] Annals of Surgery, October, 1911.

[2] Bulletin of Johns Hopkins Hospital, February, 1912, p. 33.

who, in 1904, described a method in which a fine platinum wire was passed into the veins and an electric current connected, after the two rows of sutures had been placed, so burning an opening.

The technique of Carrel and Guthrie involves dissecting the vena cava and the portal vein and clamping them above and below the site of operation, which is difficult and tedious. The union is made with straight arterial needles.

If a lateral anastomosis is to be done on easily accessible vessels, the operation is simple, but if the vessels are difficult to expose, or if hemostasis cannot be complete, it becomes very trying. In an effort to standardize a technique that could be used in all cases of lateral anastomosis, whether in making an Eck fistula, or in uniting an artery and vein in a difficult location, I have devised a forceps that takes a lateral hole either on the entire caliber of each vessel, or on any portion of it as desired. The necessity for such a forceps was first suggested by an operation done by me at the clinic of Professor W. L. Rodman, in Philadelphia, through the courtesy of Professor Rodman. The case was an arteriovenous aneurysm of the femoral artery and vein, too close to Poupart's ligament for the application of a tourniquet.

After dissecting the artery and vein above and below the aneurysm, placing Crile clamps on these vessels above and below the lesion, clamping the profunda and controlling the internal branches, an attempt was made to dissect behind the aneurysm. This was difficult and bloody, but it was thought that the blood was what remained in the sac and tissues. An incision into the communication between the vessels, was followed by profuse bleeding that was controlled with considerable difficulty.

It was suggested by Professor Rodman and by Dr. Stewart Rodman, who kindly assisted in the operation, that a forceps that could clamp these vessels before dividing them would be advantageous. On looking up the matter afterward, I

found three kinds of forceps for clamping vessels for lateral suture. One was Joani's clamp.[1] I have never seen this instrument but from the illustration the points appear frail and the handles are at such an angle to the blades as to interfere with suturing. The forceps of Stewart,[2] the jaws of which consist of large ovals, could not be used in arteriovenous aneurism. The instrument of Jeger (presented at German Surgical Congress, 1912), a diminutive Roosevelt gastro-enterostomy clamp, has straight blades and the middle blade is objectionable. It was devised for making an Eck fistula.

After experimentation and several changes, a model was devised that seems to obviate the objections of the other instruments. (Fig. 1.) These forceps for lateral suture are 5 inches long, have thin, well-tempered curved blades with longitudinal grooves, and handles that extend in the axis of an imaginary line drawn from the tip to the heel of the blades. The blades fit accurately but are soft enough to be clamped on the skin of the forearm without pain.

They can hardly injure the intima, but to make this even surer, soft, pure rubber tubing is slipped over them. The tubing should not be too close to either the heel or the tip of the blades as this might interfere with the pressure in the middle of the blades and so cause leakage. Such forceps can be used for suturing lateral wounds of large bloodvessels without entirely obstructing the blood current. In making an Eck fistula, the axis of the handles makes it possible for the handles to lie flat in the abdomen and so be out of the way. These forceps can be used where no tourniquet can be applied, as on the iliac vessels; or in operations on an arteriovenous aneurysm where hemostasis is not satisfactory by other means. Even where hemostasis is complete, they serve to steady the walls of the bloodvessel

[1] Keen's Surgery, vol. v, p. 128.
[2] Journal of Amer. Med. Assoc., August 20, 1910.

while sutures are inserted and lessen the amount of intima exposed, so preventing it from drying.

These forceps have other uses than for lateral anastomosis, or the cure of arteriovenous aneurysm. For instance, they can be employed for hemostatic forceps instead of the Crile clamp, acting in the same manner as the forceps of Matas, which are designed for temporary occlusion of the vessel. As the blades are very soft, they can be quickly applied and locked without fear of injury to the intima. I have also used the forceps satisfactorily in a gastro-enterostomy in an infant four weeks old when an operation was necessary on account of pyloric stenosis.

In lateral anastomosis of bloodvessels, whether uniting veins as in Eck fistula, or an artery to a vein, the general principles of bloodvessel suturing should be observed. Asepsis should be rigid, hemostasis complete, the tissues should be handled gently, the adventitia should be removed, and after the intima is exposed the operation should be completed as quickly as possible by uniting intima accurately to intima and leaving but little foreign substance or suture material exposed in the lumen.

The vessels are exposed as fully as possible and are mobilized. It is not necessary to dissect both vessels entirely free from their beds, if they are close together. The adventitia over the parts of the vessel to be incised is dissected off and the lateral clamps described applied, catching a deep hold on the vessel wall. (Figs. 2 and 3.) Both are applied in the same direction. It is better, if possible, for the vessel to be stripped of blood while placing the clamps. After both clamps are fastened, the vessels are anchored together with two stay sutures of fine silk sterilized in vaseline and placed at a little distance from the two extremities of the proposed anastomotic opening. The ends should be left long and the vessels manipulated by these stay sutures and not by the handles of the clamps which might slip or pull off with too much traction. An incision is then

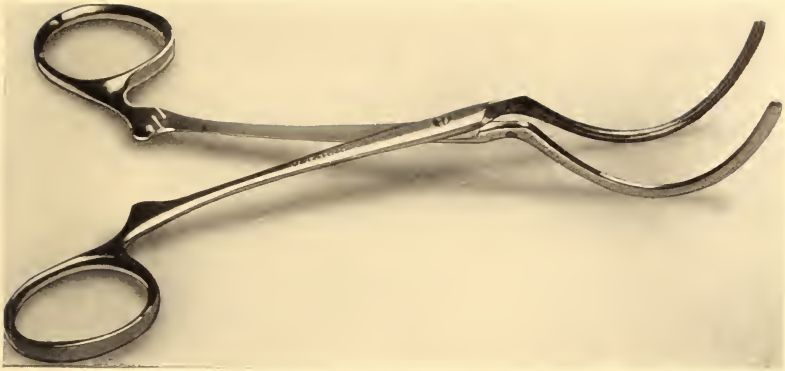

Fig. 1.—Forceps for lateral bloodvessel suturing. They are made with very light blades which can be clamped on the skin of the forearm without pain. The handles lie in the axis of a line drawn from the tip to the heel of the blades. In this way the handles will lie flat even in a deep wound and be out of the operator's way. In order still further to prevent injury to the intima, the blades may be covered with soft rubber tubing.

Fig. 2.—One forceps is shown covered with rubber and grasping the vessel preparatory to making a lateral anastomosis. If it is deemed unwise to occlude all of the vessel, only a portion of it can be caught.

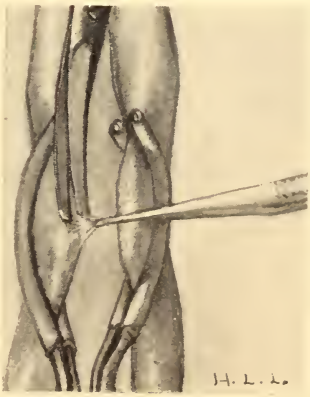

Fig. 3.—The two vessels to be anastomosed have been clamped. The adventitia is being lifted and cut away.

Fig. 4.—The openings in the two vessels are being made. The method illustrated in this drawing is that which should be employed in an Eck fistula. A small point of the vein is caught with the fine thumb forceps, lifted up, and the apex cut away with scissors parallel with the vessel. This is done on each side after the two guy or tractor sutures have fastened the veins together near the end of the proposed incision. After a small hole has been cut, a guy suture is inserted in the left wall of the vena cava and is clamped with forceps but is not tied. Another suture is inserted in the right wall of the portal vein by passing the needle from without inward. The needle is left attached but the suture is not tied. By pulling on these sutures, the small openings are exposed and can be enlarged as a slit with scissors. If a transverse opening is made here, the ends of the transverse incision will retract in the deep wound.

Fig. 5.—This shows a transverse cut, which is the method used in suturing an artery in making a lateral anastomosis for reversing the circulation. The transverse cut in the artery retracts into an oval opening. A similar opening is made in the vein. The tractor sutures are inserted as described under the previous drawing.

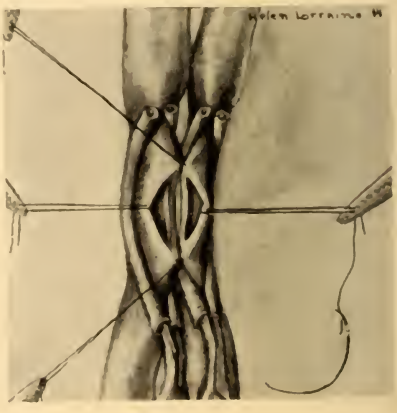

Fig. 6.—The two stay sutures and two tractor sutures are inserted and the openings are ready for suturing.

Fig. 7.—Suturing has been begun by using a very fine curved needle and black silk. It is started by going from without inward on one side and from within outward on the other side. The thread is then tied which leaves the knot *outside* of the lumen. The end of the thread is caught in a clamp. The needle is then thrust through the artery near the knot and suturing begins as an overhand continuous stitch. It is important to have the knot placed in the angle of the incision.

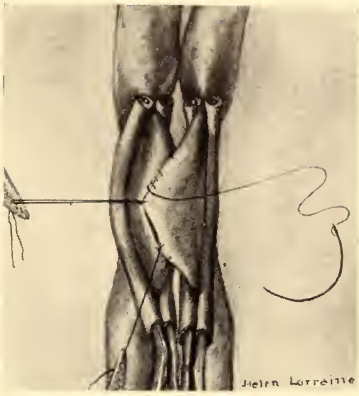

Fig. 8.—The suturing is continued and, after the upper angle is reached, the tractor suture on the left is removed and the needle and tractor suture on the right thrust through the margin of the left vessel. This is tied and when lifted up brings the sides accurately together and renders the suturing easier. After the thread has reached its original starting point it should be carried about one stitch beyond the knot and tied snugly to the end that was clamped in forceps.

Fig. 9.—The lateral anastomosis is completed. The technique is practically the same for an Eck fistula or an arterio-venous anastomosis except as shown in Figs. 4 and 5.

Fig. 10.—Drawing of a specimen of an Eck fistula in a dog six days after the operation. There is no thrombosis. Magnified about three times.

Fig. 11.—Lateral anastomosis between the carotid artery and external jugular vein in a dog. Note the clear opening and just below the opening a valve in the vein. Specimen removed twenty-one days after operation.

Fig. 12.—This shows how the clamps for lateral suture may be applied on an arteriovenous aneurysm without the necessity of fully dissecting out the aneurysm.

Fig. 13.—The communication between the artery and vein has been divided and the vessels are being sutured. It is best to use a cobbler's stitch and fine arterial needles in the artery, but if this is impossible, a fine curved needle may be used.

made into the vessels. This is done when an artery and vein are united by incising the artery transversely for about one-third of its diameter with sharp scissors. (Fig. 5.) The wound retracts leaving an oval opening, and is smeared with white vaseline by dipping a finger of the left hand in vaseline and anointing the wounded vessel. The opening in the vein is made in a similar manner and should be slightly larger than the opening in the artery. A fine thumb forceps, or "frog" forceps, holds the vessel wall while it is being incised and enables the surgeon to make the opening more accurately. A tractor suture of fine silk sterilized in vaseline is placed in the left margin of the opening in the left vessel. This is not tied but clamped with mosquito forceps. A similar tractor suture is placed in the right margin of the right vessel, but the needle end is left attached and the suture is placed from without inward. (Fig. 6.)

The sewing is now begun with a small curved, arterial needle (or No. 3 French intestinal needle) and fine silk sterilized in vaseline, starting from the angle of the incision nearest the handle of the forceps. The needle is thrust through the wall of the vessel at the angle, going from without inward on one side and from within outward on the other. The thread is then tied, holding the ends of the thread taut while running down the second knot to prevent slipping. This leaves the knot outside the lumen. The short end is clamped with mosquito forceps. The needle is again thrust through the bloodvessel wall near the knot, and a continuous overhand suture is applied, uniting the intima accurately. (Fig. 7.) This can be easily done, using a mosquito forceps for a needle holder if necessary, and pulling on the tractor and stay sutures as indicated to expose the margins of the vessel wound. At the other angle care is taken to place the sutures closely for leakage is likely to occur here. After this angle has been sutured, the left tractor suture is removed and the needle on the right tractor suture is then thrust through the wall where the left tractor suture was and this

suture is then tied. (Fig. 8.) The excess of vaseline is squeezed out, the tractor suture is lifted up so as to evert the intima, and the sewing is continued as an overhand stitch. When the original knot in the continuous suture is reached, about one stitch is taken beyond it and the thread tied to the end that was left clamped in mosquito forceps. (Fig. 9.) The clamp from the vein is first slowly removed and the line of suturing slightly compressed with dry gauze. After a minute the arterial clamp is slowly relaxed and then removed if no markedly spurting point occurs. If it does, the clamp is reapplied and a suture placed at the spurting point. A ligature is placed on the cardiac side of the vein to prevent the blood being immediately returned to the heart.

In creating an Eck fistula, this same technique is followed except in incising the bloodvessels it was found that a transverse incision was not practical in large, thin vessels in such a deep wound, for it was difficult to suture the deepest portion of the transverse incisions. The opening in the veins is made as follows: A very small bite of the vena cava about the middle of the proposed incision is caught with the "frog" forceps or with mosquito forceps and pulled up to form a cone whose apex grasped in the forceps is cut off with curved scissors. (Fig. 4.) A tractor suture is inserted in the outer wall of this small opening in a similar manner as in arteriovenous anastomosis. The same procedure is carried out on the portal vein and a tractor suture inserted from without inward and the needle left attached. These openings are then enlarged longitudinally as far as desired. The rest of the technique is followed exactly as described for arteriovenous anastomosis. It is possible, however, to use successfully a coarser needle and thread in Eck fistula than in arteriovenous anastomosis as the pressure is very low in the large veins.

In operations upon arteriovenous aneurysm, if a tourniquet can be applied and complete hemostasis obtained, the

division of the communication and suturing the vessels are often simple, but even in such instances the use of these forceps would probably make the suturing easier.

When it is impossible or impracticable to secure complete hemostasis by a tourniquet the problem is much more difficult. If the nutrition of the limb is seriously affected, or if the heart shows signs of failing under the extra strain on the venous side, operation should be attempted. In a heart that is already incompetent, pressure upon the aorta for temporary hemostasis, or ligation of a large vessel might result disastrously and the safer method under such circumstances would be to reëstablish the circulation in both the artery and vein. Here it is advisable to dissect both vessels carefully, exposing the lesion and then to grasp the artery and the vein with the forceps for lateral suture of blood-vessels. (Fig. 1.) After grasping the artery and the vein their communication is severed, the edges of the wound in the vessels properly trimmed, and with a cobbler's stitch in straight arterial needles or an overhand stitch in a curved needle, the opening in the artery and then in the vein is closed. (Figs. 12 and 13.) If possible without too much constriction of the lumen, a continuous reinforcing stitch over this may also be used. As the artery is often dilated on the cardiac side of an arteriovenous aneurysm and constricted distally, it would be advisable to diminish the pressure from the enlarged artery by partially closing its lumen with a surrounding strip of fascia, a loosely applied aluminum band, or infolding the artery by sutures as suggested by Matas and Allen.

TRANSPLANTATION OF THE ANTERIOR TEMPORAL ARTERY

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Occasionally defects of the cheek, caused by accidents, or as a result of operation for malignant disease, or from gangrene, are so extensive that plastic correction is exceedingly difficult. The margins of the defect are frequently fixed to the bone and do not permit much stretching. If the flaps are taken from the arm, the character and texture of the skin is so different from the skin of the face that the contrast is very noticeable. Then, too, it is frequently necessary to have an epithelial lining on the inside of the mouth, and though a mucous membrane lining is preferable to one of skin, it is often impossible to secure mucous membrane.

Flaps from the forehead are used to remedy these defects, and are taken with the pedicle either from the temporal region or from the middle of the forehead. This, of course, necessitates cutting the pedicle later and returning it to its original position. If the anterior temporal artery is included in the pedicle, the flap is thus deprived of an important blood supply. Frequently flaps that cover defects of the cheek obtain their sole nourishment around the edges, and if a flap has also been turned in to make a lining, there is a still greater demand upon the external flap for blood supply. Dunham, of New York, has met this objection by dissecting the temporal artery from the flap, and return-

ing the pedicle minus the artery to its original position. This, of course, is an improvement, but it necessitates two operations and the dissection of the temporal artery from the transposed and infiltrated pedicle is more difficult than a dissection from the normal tissue at the original operation.

On two occasions I have transplanted the anterior temporal artery, dissecting it free from its origin to the margin of the proposed flap.

The anterior temporal artery presents peculiar advantages for transplantation. It is not essential to the nourishment of the forehead or scalp, which has an abundant anastomosing blood supply. It is tortuous and when dissected free, even with some surrounding tissue, it may be straightened and will reach much farther than before dissection. This permits placing the flap in positions quite distant from the origin of the artery, and the maintenance of an abundant blood supply.

The patient should be prepared for rectal anesthesia according to the method of Gwathmey. The bowels are opened by a dose of oil the night before, followed by soapsud enemas two to three hours before the operation. An hour before the operation a suppository of 5 to 10 gr. of chlorotone is given. A hypodermic of $\frac{1}{4}$ gr. of morphin and $\frac{1}{120}$ gr. of atropin is administered a half-hour before the operation, and the injection of oil and ether is begun slowly about ten minutes later. The mixture consists of pure olive oil and either varying from equal parts in children, to three parts of ether and one of oil in cases difficult to anesthetize. In adults, usually two parts of ether to one of olive oil is a satisfactory mixture. The amount injected is 1 oz. of the mixture to every 20 pounds of body weight, but in any case it should not exceed 8 oz. of 75 per cent. solution of ether in oil. This is given slowly in the room, with the patient turned on his left side, and should take from five to ten minutes. The patient usually goes under the anesthetic gradually. If anesthesia seems too profound, especially as

indicated by cyanosis and disturbance of the respiration or by a bad pulse, some or all of the mixture can be withdrawn through a rectal tube. About five minutes before the operation is concluded, all of the mixture is withdrawn, the rectum and sigmoid are irrigated with cold water, and several ounces of pure olive oil are slowly injected and allowed to remain. This anesthesia in my hands has been most satisfactory for plastic work about the face, for surgery of the neck, and particularly for such an operation as transplantation of the anterior temporal artery.

The cheek is prepared for the new flap by trimming away the scar tissue along the margins of the defect and by undermining the skin slightly. The position of the flap to be transplanted is outlined on the forehead with the point of a knife, going as near to the hair line as possible. An incision is made over the region of the anterior temporal artery, extending from its origin to the point at which the artery enters the proposed flap. This incision should be straight, no matter what the course of the artery. Great care is taken not to injure the artery and not to grasp it with forceps. It can be easily handled by picking up the tissue around it with delicate thumb forceps. Considerable tissue is included with the artery in order not only to avoid injury to the artery, but to preserve its nerve supply. After the artery has been freed, the flap is cut and placed in position. This gives an idea where the artery shall be buried (Figs. 1, 2, 3, and 4). The flap is then covered with cloths wrung out of warm salt solution and an incision for burying the artery is made just through the skin. The margins of this incision are undermined freely, but not too deeply. In this way the branches of the facial nerve are not injured. The flap is placed in position and fastened with a few sutures. It should not be sutured too tightly, because the flap has too much nutrition and unless there is some point where the excess of blood can ooze out for the first day or two, the tension in the flap from the arterial pressure may be so

great as to cause partial necrosis. This, in fact, is the chief danger, not too little but too much blood supply. If it is necessary to have an epithelial lining, a flap may be turned up from the neck and sutured with the skin side toward the cavity of the mouth before the anterior temporal artery is transplanted. The illustrations show the manner of doing this.

By the second day the flap is swollen and becomes a dark purple color. If it is too tense every few hours a sharp knife can be inserted along the edges of the flap to scrape it a little so as to promote bleeding and relieve the tension. After a week the swelling begins to disappear and new venous capillaries drain away the blood. The efficiency of the artery can be demonstrated months after the operation by pressing upon it and noting the change in color of the flap.

In two cases in which this operation was done the artery has remained patent and is pulsating several months after the operation. In the first case, all of the flap took. In the second, a middle-aged woman in poor health, about two-thirds of the flap sloughed away on account of excessive passive hyperemia.

The first case, Mr. W. H. D. aged twenty-two years, was injured on February 2, 1914, by a shot-gun while trying to quell a disturbance among the laborers of a mine, of which he was superintendent. The gun was discharged at short range and blew out his left eye, a good portion of the left maxillary bone and the septum of the nose, together with the soft tissues over the cheek. The accompanying photograph shows his condition about three weeks after the the injury. A large cavity was left connected with the nasal fossa. This was closed by transplanting from the forehead a flap with the anterior temporal artery. The technique was as described above. All of the flap took. The photograph taken about three weeks after this operation shows the line of incision for dissection of the artery and also the incision under which the artery was transplanted.

Mrs. S., aged forty-seven years, was referred to me for a recurrent cancer of the cheek. She had been operated upon a few months before by another surgeon and as recurrence was prompt and the glands of the neck were involved the prognosis seemed bad. A block dissection was first done on the upper part of the neck, removing glands, fat and fascia in one mass. The cancer in the cheek, which was about an inch and a half in diameter, was then excised with a Paquelin cautery. The photograph shows the condition about ten days after this operation. (Fig. 7.) The defect was, of course, extensive and the deformity great. A flap of skin was turned under as shown in the accompanying illustrations, and sutured to the wound with the skin surface inward. The anterior temporal artery with a flap from the forehead was then transplanted as in the previous case. The flap became purple and tense, but on scraping its edges and letting out some blood its color would again become normal. The growth of capillaries was poor, and about two-thirds of the flap sloughed off on account of the intense passive hyperemia. To the well-nourished remnant, however, flaps from neighboring tissues were later attached and grew satisfactorily. The photographs show her condition before (Fig. 7) and after the plastic operations. (Figs. 8 and 9.)

DISCUSSION ON THE PAPERS OF DRS. MASON AND HORSLEY

Dr. E. P. Richardson, Boston.—Mr. President: In regard to Dr. Mason's paper, I will say that I have used the Kimpton-Brown tube in a few cases and find it extremely simple and efficient. There has been no trouble whatever from clotting of blood in the tube during the transfer of blood from the donor to the recipient. If any clotting should occur in the tube, it becomes impossible to force blood out into the recipient. The changes which may take place preliminary to clotting seem to be well cared for by the recipient of the blood. I have personally seen no bad result attributable to the method.

Fig. 1.—First step of transplantation of the anterior temporal artery with a frontal flap. Outlines of the flap on the neck and of the frontal flap, together with the incisions for dissecting out the anterior temporal artery and for burying it in its new location, are shown.

Fig. 2.—The flap from the neck has been sutured in position. The anterior temporal artery and frontal flap have been freed, and are ready to be transplanted.

Fig. 3.—The anterior temporal artery with the frontal flap has been transplanted and the flap sutured in position. The raw surface left on the forehead has been diminished by sutures at its angles.

Fig. 4.—The flap in the neck has been dissected free and drawn under the bridge of skin separating its base from the defect in the cheek. The artery has been partially dissected. Insert shows a section of the artery with ligation of posterior temporal artery when necessary to secure greater length.

Fig. 5.—Mrs. S., with eyes closed, showing there is no paralysis of any branch of the facial nerve.

Fig. 6.—Photograph of Mrs. S. about three weeks after removal of recurrent cancer of the cheek with Paquelin cautery. The tongue, alveolar process, and some denuded bone can be seen.

Fig. 7.—Mrs. S. The defect in the cheek closed. About two-thirds of the frontal flap sloughed away, but enough remained to close the upper portion of the wound.

Fig. 8.—Photograph of H. D. about three weeks after the injury, showing a large cavity communicating with the nasal fossa.

Fig. 9.—Photograph of H. D. three weeks after operation in which a frontal flap with anterior temporal artery attached was transplanted to cover the defect. Note the incision for dissecting the artery and also incision for burying it. The artery can be distinctly felt pulsating in its new bed.

In applying this method for transfusion in hemorrhage of the newborn, the tube is large and the veins of the newborn are so fine and delicate that it needs, I think, some modification. In this regard I have followed Vincent's use of Brewer's tube tied into the external jugular vein. If that is done, it is easy by means of rubber connection to connect the Kimpton tube with this tube and transfer blood into the newborn in this way.

Dr. J. D. S. Davis, Birmingham, Alabama.—One advantage of this method is that you can estimate the amount of blood transfused. When I first received this tube there was nothing said about the pressure method of forcing blood from the donor to the recipient, and I attempted its use without using a pressure or force bulb and made a failure. In my subsequent cases I have used syringe bulb to force the blood and my results have been more successful. We can estimate something of the amount of blood transfused by taking the blood-pressure and by weight. In my early experiments in transfusion of blood I had scales prepared to weigh my patients so as to estimate the amount of blood transfused; however, I found this not practicable. I believe the greatest advantage in the use of this tube is in having control of the amount of blood transfused.

Dr. W. R. Jackson, Mobile, Alabama.—The only criticism I have to make of this tube is the difficulty of the technique. You take this tube out and put another one in the vein. In such a process you no doubt have a clot formed in the vein very often, and that is the point I would criticise.

Dr. O. H. Elbrecht, St. Louis, Missouri.—I have done a number of direct transfusions by the method of Dr. Crile. I have transfused dogs and eight humans, and was not able to tell whether I got two ounces or a pint over in any of these patients by the Crile method.

The difficulties referred to by the last speaker (Dr. Jackson) are plain to anyone who has tried the method. I have seen Dr. Crile use it and he was kind enough to show me the technique on dogs and the method worked admirably especially when the carotid and external jugular are used. It works beautifully experimentally, but on the human being I must confess the dangers of clot formation are greater and sometimes you cannot feel or see the pulsation of the vein one or two inches away from the anastomosis.

The same is true of the adventitia. The adventitia offers greater difficulty than the method referred to by Dr. Horsley

in that you expose a much larger area of the radial artery. By the time you get the radial artery out and turn back a cuff and then expose a sufficient portion of the vein and make the anastomosis, the adventitia is very apt to contract and thus choke the normal flow. If you do not expose them freely you are putting sufficient traction or torsion on the vessels to occlude the lumen, and therein lies the principal objection to the Crile method. The only method you have of determining whether the blood flows is by the general appearance of the donee, and possibly the pulsation of the vein at its most distal portion from the anastomosis. You cannot tell from the donor or pulsation in his artery. I have had improvement in some cases, but in others I could not say whether I got half an ounce of blood over or not. This tube is a decided advantage over the Kimpton tube in that you know exactly how much blood you are getting into the patient.

Dr. Charles H. Mayo, Rochester, Minnesota.—Just a word in regard to arteriovenous aneurysm. Very frequently the little opening between the artery and vein is only as large as the artery, and whenever it is no larger than the artery, if a permanent ligature is placed around the anastomosis and drawn fairly snug, but not sufficiently tight to break the intima, it works admirably. I have tried it in the popliteal artery.

To fill large spaces in the face, turned pedicle flaps may be used, yet they are a nuisance in the mouth. If, as Willard Bartlett describes, the side of the tongue is slit and the edges turned up, suturing this tissue outside the line of the jaws, the blood supply is good, and it will practically always give union. After ten days slit off one-quarter of the tongue, go back and close the side of the tongue and flap and instead of skin, there will be a pliable amount of mucous membrane to line the mouth.

The next point brought out in the paper is an important one, namely, that more flaps die from too much blood supply and too little venous return than from lack of blood supply. If granulation tissue can be obtained it is unnecessary to have a strongly vitalized flap. The pedicle kills more flaps than lack of pedicle. In cancer of the breast where there is a large extrusion and the tissues are brought together, the vein loses itself under tension. There is congestion and swelling and too much blood which cannot get out because there is no vein. In such cases it is necessary to make punctures to let out the serum and relieve tension. In the cases of hemorrhoids, with great swelling

after extrusion, if a big enough stab is made behind the hemorrhoid, the exuded serum will take care of itself.

Dr. Mason (closing the discussion on his part).—Just a word in answer to Dr. Jackson's remarks about the difficulty of the use of the second tube, and also the remarks made about the quantity of blood necessary. I do not believe enough experimental work has been done by any of the methods to determine what quantity of blood is necessary. A great many operators and experimenters think that the addition of just a small quantity of fresh blood to these patients would tide them over a crisis present and put them on their feet. It is claimed by Bernheim that in doing an end-to-end anastomosis, within the first five minutes you can tell what effect you are getting. On the other hand, David and Curtis claim that large quantities are necessary. Personally, I have not had enough experience to make any definite statement at this time. Where one is working in a hospital there should be two or three tubes on hand, and just as the first tube is withdrawn it may be handed to an assistant, and the second tube may be put right into the vein and the two tubes filled without any delay at all. Anyone can hold the tube for a few minutes to transfer blood from one patient to another. When the vein of the recipient is opened the first tube may be inserted, pumped out, and the second tube inserted and pumped out. The difficulties are imaginary rather than real.

While the last word has not been said regarding the technique of transfusion, up to the present time this is the simplest and surest method of transfusion I know of and one that the surgeon can use with equal safety either in a hospital or in the home of the patient. The simplicity and advantages of this method will vastly broaden the field of successful transfusion.

Dr. Horsley (closing the discussion).—There is a great number of methods of transfusion. Dr. Mason has beautifully presented the method of Kimpton. Its chief advantage is that the quantity of blood transfused can be measured. Another way of ascertaining the amount of blood is by weighing the patient before and after transfusion. In my opinion, however, the accurate measurement of the amount of blood is not essential. The regulation of the dose of blood given should be made by the clinical symptoms of the donor and recipient regardless of the amount that it transfused. When the pulse, blood-pressure, color and general condition are markedly improved in the

recipient, it is time to stop, especially if the hemoglobin has increased 50 per cent. of what it was before the transfusion.

We do not know what happens to blood after it leaves the intima. The physiologists have not definitely worked out the clotting of blood, and many agents involved in this process have not been isolated and are more or less hypothetical. It is probable at least that blood that stands even for a short time when not in contact with the intima may undergo some subtle change that makes it less desirable than the warm, oxygenated, nutritious, arterial blood that it goes directly from the artery of the donor into the veins of the recipient. The patient who needs a transfusion is always in a most serious condition and in such cases the arterial blood would seem better than the venous blood which is filled with waste products of the tissue through which it comes.

While direct transfusion by suturing may be a little more difficult than the ordinary mechanical means, this difficulty has been greatly exaggerated. Any one who has taken the time to work out the technique on animals a few times can do a transfusion if he selects a sufficiently large vein with a branch near the line of union. In such an instance even if a thrombus occurs, a smooth probe annointed with vaseline can be run through the branch up through the line of union and can dilate the radial artery if it has contracted. Pressure upon the main trunk of the vein just before withdrawing the probe blows the little clots out through the branch, and the branch can then be clamped. For obvious reasons this cannot be done when a cannula is used. If for any reason it is desirable to do another suturing, only a small portion of the vein and artery is sacrificed, if the first union is made by sutures, whereas in a cannula so much is sacrificed as to make the union difficult.

OPERATIVE TREATMENT OF FRACTURES

By Wm. R. Jackson, M.D., F.A.C.S.
Mobile, Alabama

When fractured ends of bones cannot be adjusted or coapted snugly by traction, countertraction and manipulation, or when coaptation cannot be maintained by splints and plaster of Paris, then it becomes necessary and proper, yea, mandatory, to resort to measures and procedures that will coapt and maintain adjustment of the fragments. This rule applies to any fractured bone. Delayed or viscous union caused by displaced fragments and interposition of soft tissues require operation also.

Most simple fractures can be adjusted without open operation, while others demand operative intervention.

It has recently been observed that when any fracture is dealt with by open operation, that there is always *delay in union, delay of callus formation,* hence the time for union may be four to eight *months* instead of four to eight *weeks.*

The cause of delayed union in operative cases of fracture, is disturbance of the circulation in the ends of the fragments, caused by handling and separation of soft tissues, the periosteum, muscles, etc., from the bone, and injury to the medulla. Callus production is greatest from the medulla, then from cancellous, then from compact layer.

It has long been taught by Ollier that the periosteum is a bone (callus) producer, that the inner layer of the periosteum (cambium) was the most powerful osteogenetic agent in the union of bone, but since the clear demonstrations of Macewen that the periosteum takes no part in bone

production, and that only bone produces bone, most authorities concede that the periosteum to be only a limiting membrane of bone. Macewen showed that transplants of periosteum alone never resulted in production of bone, while bone, without periosteum, resulted in reproduction of bone cells, and growth of the transplant.

J. B. Murphy claims that bone transplants will reproduce bone with or without periosteal covering, provided that the transplant contacted with fresh bone cells at one or both ends of the bone.

Murphy contends that new bone cells (osteoblasts) form from either end of the sectioned bone, and circulate through the Haversian canals of the transplant, and while there they receive nourishment and multiply rapidly and cause absorption of the old bone cells, the transplant acting only as a scaffold or osteoconductor and is not osteogenetic.

The operative measures used mostly in the treatment of fractures today, consist in the use of plates and screws; nails and metal bands; staples and wires; detachable drills and interosseous or intramedullary transplants of autogeneous bone.

Many cases require only operative coaptation of the displaced fragments plus plaster fixation. It becomes necessary to intervene by open incision in the following fractures: Fracture of neck, trochanter, upper and middle thirds of the femur, fracture of the patella, fracture of both bones of leg (not always) frequently of the Clavicle, olecranon process and Pott's fracture, and any fracture where coaptation cannot be effected and maintained.

To obtain the best results in the treatment of fractures, *repeated examinations by x-ray* should be made, *before, during* and *after* application of fixation dressings. Most frequently, in simple fractures, perfect coaptation under *x*-ray *will not remain after splints are applied*, the amount of displacement depending upon the distance from the bone to the splint on the surface of the limb.

Overriding, angulation, rotation and lateral displacements will occur in 85 per cent. of all cases, hence the open or operative treatment is gaining ground with our best surgeons.

While delayed union, non-union (in some cases) and occasionally infection, may mar some of our cases, the good results in the great majority of them encourage us to continue to do better mechanical and aseptic work.

Technique of using Lane's plates:

1. Thorough iodine disinfection of the whole field.

2. Securing towels above and below line of planned incision by clips.

3. Securing towels to each edge of skin incision by Moynihan's towel clips.

4. Have all screws proposed to be used, securely held by forceps, likewise the plate itself held by proper forceps.

5. Don't put gloved hands or fingers into the wound. Coaptation is effected by traction forceps and elevators.

6. Don't touch that part of any instrument which comes in contact with the tissues.

7. Don't handle or touch sponges with the hand (gloved), but always use sponges held with forceps.

6. Don't suture the skin but close preferably by metal skin clips. Always denude the ends of bone fragments.

9. Put on plaster cast and do not make extension after plates are placed.

10. Remove skin clips on tenth to fourteenth day and continue cast till solid union of bone occurs.

Conclusions. 1. When plates are used, they should be placed on fleshy side of limb and not subcutaneously.

2. Screws should fit sungly and hold the plate tightly to the bone. This should be done if a longer plate and more screws are made necessary as any motion prevents union.

3. When it ever becomes necessary to remove a plate, it was not properly placed or technique was faulty.

4. It is not always necessary to remove a plate when infection has occurred.

5. That plating of fractures does not always mean bony union, as this fails to occur in some cases, even after bone transplants are used; these are the "non-union" cases. If a little callus forms at end of ten months, union may be confidently expected. If fifteen months fail to show any callus formation, then we decide that it is a "non-union" case.

6. Compound fractures should not be plated until converted into simple ones.

7. Shortening of the limb always follows plating in chronic or "ancient" fractures because of the necessary resection of ends of fragments for coaptation.

The following cases will show some of the results of operative treatment of fractures:

Case I.—Male, colored, aged twenty years. Fracture of the upper third of femur, caused by a fall from a height, striking with great momentum the thigh. Patient was not seen until one week after the accident, being under the care of the family physician during the preceding seven days.

Traction and countertraction (Buck's extension) failed to coapt the fragments. The patient was anesthetized and traction and manipulation failed to give satisfaction. Fourteen days after the fracture occurred, Lane's plate was placed and the limb put up in plaster of Paris, union per primam in ten days, sutures removed; plaster worn two months, at the end of which time, slight motion was perceptible, and at the end of fourth month the patient was walking without crutches.

Case II.—Female, colored, aged ten years. Fracture of middle third of femur, with marked lateral and overlapping displacement which did not yield to Buck's extension treatment. Lane's plate placed ten days after the fracture. In fourteen days the sutures were removed, union perfect. Cast kept on two months when the patient was permitted to walk without cast; union firm in three months.

Case III.—Male, white, aged twenty years. Fracture of lower third of femur which occurred while wrestling. The patient previous to fracture had disease of lower end of femur with discharging sinuses for past fourteen years, beginning when the boy was six years of age. The fracture occurred at this weak point of bone.

Buck's extension, etc., failed to effect a cure. At the end of two months Lane's plate was placed opposite the diseased side in healthy tissue. Wound healed in ten days and sutures removed, but sinuses continued to discharge from the diseased area. Plaster cast kept on four months, when plate gave rise to irritation and was removed. Removal showed perfect bony union at point of fracture. Necrotic area of bone and sinuses were curetted and drained, and ten months later the patient was entirely well.

Case IV.—Female, white, aged fourteen years. Fracture of middle third of femur, resulting from being violently thrown against timbers by a hurricane. Fracture of the skull also present.

Treatment of skull fracture, trephine, etc., was done by another surgeon, the fracture of the leg being almost entirely neglected. Two months after the fracture of the femur there was no union; overriding and angular displacement and four inches shortening were present. At this time the patient's general health permitted of operative treatment of the fracture. Lane's plate was placed on outer side of the bone, and cast put on—union by first intention, and sutures removed in ten days, but free mobility at the point of fracture. Cast kept on and renewed several times, but at the end of four months no union, and tendency to angulation. Six months passed and still motion marked at the point of fracture. At the end of eight months one of the screws caused necrosis of the overlying skin, and necessitated removal of the plate, and yet there was no solid union. A new cast was put on and the patient put out of doors on crutches, and now fourteen months since

the fracture, the patient is walking without crutches. The knee was anchylotic at the time of open operation and continued until permanent union, when it was forcibly flexed under general anesthesia, and yet there is only limited motion in the knee-joint.

Case V.—Female, white, aged seven years. Fracture of middle third of femur, resulting from a fall from high fence, lateral and overlapping displacement and angulation and shortening. One month after the fracture when extension treatment failed, Lane's plate was applied. Twelve days later sutures removed, union by first intention. Cast continued two months, no union after four months. Plate caused suppuration at the end of fifth month. The plate was removed but no solid union, plenty of soft callus and great mobility at point of fracture. Cast renewed and patient put to walking with crutches. Ten months since fracture and marked mobility still present in the fracture line.

Case VI.—Male, colored, aged thirty-seven years. Fracture of upper third of femur, also right humerus, and both tibia and fibula of left leg. Injury in saw mill being the cause of the multiple fracture. Coaptation of other fractures was satisfactory, but the femur would not remain coapted. Lane's plate placed ten days after fracture. Michel clips used in closing the skin and cast applied. Primary union on tenth day when the clips were removed. Cast kept applied. Two months after operation union apparently firm. Patient allowed up on crutches, and in four months walked without any aid.

Case VII.—Male, white, aged forty-eight years. Fracture of lower third of radius and ulna. Shortening and angulation. Patient treated in country. Three months after fracture, no union. Lane's plates were placed on radius and ulna. Clips to skin, and plaster cast applied. Twelve days after operation clips were removed. Union by first intention. New cast applied and patient is still under observation. Three

months since operation and marked motion at point of fracture is present.

Case VIII.—Male, white, aged fifty-eight years. Fracture of lower third of humerus. This patient was treated primarily by another surgeon, by first plaster cast, then wiring the bone and then Lane's plate, all of no avail. No union nine months after fracture.

Bone transplant from patient's tibia was inserted firmly into each end of fractured fragment after reaming them out. Limb put up in plaster cast. Ten days later sutures were removed and suppuration in lower angle of wound was present. Drainage and plaster fixation were kept up four months and *x*-ray failed to show any osteogenesis in the transplant, and mobility and infection persisted. At end of six months infiltration of pus from the transplant threatened the life of the limb, when the transplant was removed, showing not the least indication of new bone production, on the contrary absorption (osteoclasis) was noticeable. Result of the fracture was fibrous union (pseudo-arthrosis) with fair motion and anchylosis at elbow-joint.

Case IX.—Male, white, aged nineteen years. Fracture of both tibia and fibula, middle third, resulting from automobile wheel passing over the limb, making it a compound fracture. Adjustment under anesthesia was made and splints (felt) applied. *X*-ray showed displacement laterally and angulation and shortening. Open operation six weeks later enabled replacement of fractured ends, which were serrated in such a manner that coaptation remained without application of Lane's plates or other mechanical device. Suture and plaster cast. In ten days primary union of soft tissues, but mobility at point of fracture persisted eight months, when solid firm union resulted.

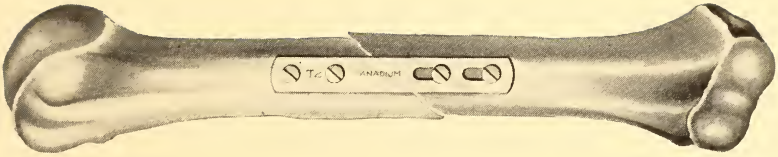
A MODIFICATION OF LANE'S PLATES

By H. Stuart MacLean, M.D.
Richmond, Virginia

In the operative treatment of fractures the writer has frequently had occasion to use Lane's plates. It has seemed, however, that not infrequently there resulted either delayed union or the necessity for the ultimate removal of the plate. As the use of Lane's Plates has increased, these two complications have been noted until there is a strong feeling toward abandoning these plates entirely. While it is true that the plates probably have not the field of usefulness which was first believed, yet there are, and probably always will be, certain cases in which such a device must be used for want of a better. It is a serious objection to their use to place firmly in close apposition to bone such a large surface of foreign material, but we have innumerable records of the use of these plates where good results have been obtained and no trouble arisen from the encapsulated plate.

In following these cases quite closely it had been noticed that when good union was obtained promptly it would frequently be found that the ends had rotated slightly; or a screw had worked loose and allowed firm apposition of the fractured ends at the point opposite to the bone plate. It was this condition which suggested the simple modification, as shown in the specimen submitted.

When a Lane Plate has first been properly and firmly applied it is calculated to maintain from the outset close,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accurate approximation of the fractured ends. In the opinion of the writer it is this very fact of rigidity which tends to bring about delayed or non-union. It is well known that in the process of healing of a transverse fracture of a long bone the natural result is a slight degree of shortening, which is explained by absorption of bone tissues from both the fractured ends. It follows then that with the rigidity and accurately applied Lane Plate the attrition and absorption in the fractured ends give a degree of actual separation of the ends in from two to four weeks which is as firmly maintained as is the accurate approximation when the plate is first applied.

In order to overcome this difficulty we have had the plates made with an oblong opening in one end instead of the usual round opening for the screw. When the plate is applied the screws are placed at the distal end of the oblong opening, and as attrition and absorption occur, the action of the muscles along the line of fracture will cause the approximation to be continued by the slipping of the screws in the oblong slot. This plate has given more satisfactory results than the original plates, and *x*-ray pictures show that the screws do slip in this slot from one-third to the entire length of the opening.

DISCUSSION ON THE PAPERS OF DRS. JACKSON AND MACLEAN

Dr. Henry O. Marcy, Boston.—Mr. President: I take this occasion to speak on this subject for the purpose of confuting some of the statements that have been already accepted as orthodox.

I have made many long, painstaking observations of the histological conditions which go on in fractures in the lower animals. Some of you may be familiar with my published observations in this regard. The first thing we found was a limited necrosis. This was first pointed out by Ercolani, and this explains the statement of the last speaker as to possible shortening of the

fragment. The next thing that takes place is the exudate which we call ordinarily the callus. The callus consists, first, of an exudate of leukocytes. Within six or seven days I succeeded in making injections of continuous pressure of about seven pounds of hot gelatin filling the new formed loops of vessels without rupture in rabbits and guinea-pigs.

To make my remarks as clear to you as I possibly can, I will illustrate upon the blackboard. Little by little the osteoblasts develop. The osteoblasts in this section (indicating) we call the ordinary callus. There goes on a process of the same type, radiating from the medullary process of the long bone here (indicating), and little by little we find the internal callus developing. This is a normal state of things. I made careful studies which ran over a period of two years in order to demonstrate more accurately and more thoroughly the application of the means to the end of making a complete and absolute knowledge of the process we call the repair of bones. The less the damage to the surrounding tissue the better. Here comes in an objection to the Lane plate. You remove a certain portion of the periosteum in the denuding. You have damaged a certain portion of the tissues all about the external portion of the bone, and largely rely on the repair which goes on in the endothelium. Damage the tissues as little as possible in making fixation and retention and trust to nature for the result and generally under favorable conditions a perfect union results. This is the reason I still cling to the method of wiring in one place and not two or three places. The less we damage tissue, the easier we put the parts in coaptation and fixation, the safer and surer the result, and with the use of the properly applied plaster splint which has been developed during the last twenty years we have an agent of the greatest possible value in the application of mechanical means for the retention of fractured bones.

Dr. Randolph Winslow, Baltimore, Maryland.—I am not a physiologist or an experimenter, but I do not see how it is possible that the periosteum has no effect in the reproduction of bone.

At one time I had a young girl under my care with acute osteomyelitis which affected the whole tibia from its upper to the lower epiphysis. In consequence of that the whole shaft, when an incision was made, came away, I sent a word to the people who were waiting that the child's limb ought to be

amputated, and they refused to have it done. I said the child would doubtless have a limb of no value. They refused to permit an amputation, and sometime later I heard the child was walking with a good limb. If the periosteum did not not restore that bone from one epiphysis to the other, what did restore it? The whole diaphysis came away, and I do not see what regenerated the bone unless the periosteum did.

A few years ago I had an old man, seventy-six years of age, with bad kidneys, and heart and sclerotic arteries, in whose case the *x*-ray showed that the fragments were widely separated and there was great deformity. He could not be laid down in order to apply splints and an operation was out of the question. I tried traction by means of weights without a splint and it did not answer. I tried sand-bags and they were not much better; and when I left, after a while, to go on my vacation I supposed I should find him dead on my return. Instead of that absolute union had occurred, with the fragments very far apart.

Dr. Richard Cabot came down from Boston and delivered a lecture upon heart cases and this man was before the class, and he expressed the opinion that if any accident was to happen to this man, or that he should break his leg, he would die. I had occasion to tell Dr. Cabot afterwards that the man had met with a serious accident from which he did not die, but had actual bony union. Although the fragments were widely separated, and there was deformity, he had a leg upon which he could walk. As I have said, the man was seventy-six years of age, with pipe-stem arteries, bad heart and bad kidneys. I think the fracture was repaired by means of a bridge of untorn periosteum.

In regard to the operative treatment of fractures of the bones, I believe that in this, like almost every other thing, the pendulum has swung first to one extreme and then to the other, and will gradually come to rest in the middle ground. The pendulum has swung in my opinion entirely too far in the direction of operative treatment. Eight years ago I happened to be in Guy's Hospital, London, and met Mr. Lane, who asked me if I had ever done plating of bones, and I said yes. He asked, how long ago did you do it? My reply was ten or a dozen years ago. As a matter of fact, I remember one case I had over twenty years ago in which I used a plate almost like the one Dr. MacLean has exhibited here, except it did not have slots. That man was a middle aged man; he is now an old man. The plate is still on his bone with complete union. What I wanted to say was,

Mr. Lane seemed to be surprised that anybody had plated bones so long ago, and he asked me if I had published it. I told him I had not.

There are certain fractures where we cannot by any possibility get good union except by operation. There are certain fractures, and those I think are the majority, where there is absolutely no necessity for operative treatment. I do not believe that our ancestors, my father and the fathers of others, were absolutely ignorant when they undertook the treatment of these cases, and I believe in the vast majority of cases they got results that will compare very favorably with our own.

In regard to a fracture of the clavicle, I do not see any good reason why we should plate it or operate on it. If a fracture of the clavicle occurs in a young woman or an old woman, either she would rather have the little lump that remains than to have the scar of an incision, so that in the bulk of cases of fractures of the clavicle the lesser evil is the moderate deformity, often none that results rather than a scar.

Fracture at the upper end of the femur undoubtedly in most cases requires operation. In oblique fracture of the upper part of the shaft of the femur the only other way you can treat it is by extension in the abducted position.

In a fracture at the lower end of the femur, where the condyles of the femur turn backwards in consequence of contraction of the gastrocnemius muscle, formerly we used the double inclined plane, but it will be much better treated and more satisfactorily treated by means of operation.

Dr. J. M. Mason, Birmingham, Alabama.—I am very glad to see that Dr. Jackson has taken a conservative position in regard to the treatment of fractures, because I believe, like Dr. Winslow, that the pendulum is swinging and will soon occupy a somewhat middle ground.

I think the four following points ought to govern us in deciding on any individual fracture as to whether or not it should be treated by the open method. First, a fracture where coaptation is necessary, and where we are unable to keep the fragments in apposition, should be treated by open operation. Second, we ought to consider the probable functional result in a given case without perfect reduction. Third, in certain instances, especially in fractures in young women about the shoulders and exposed parts of the body, they should be informed of the absolute necessity of leaving a scar in any fracture we are going

to treat by operation. Fourth, we must take into consideration the possibility of sepsis and non-union. We will not have sepsis, as a rule, but in individual cases we may get it occasionally. Instead of treating fractures as a class, we should treat each one individually and go over these three or four points.

Dr. H. H. Trout, Norfolk, Virginia.—There seems to be a misunderstanding regarding the question of the periosteum, and for the very good reason that we do not clearly understand the periosteum. Dr. Cotton, at a meeting of the American Medical Association two years ago, showed there were two layers of periosteum, the outer fibrous layer and an inner osteogenetic layer. I do not think that point has been gradually understood.

As to the Lane plate, we have had bad results with it. We took a series of *x*-rays in cases that had been plated and found there was a bony deposit opposite the plate. With that in view we started a series of experiments of infecting Belgian rabbits with every type of organism, and we found in 90 per cent. of the cases the little vanadium screw put in the infected field would work out, whereas 80 per cent. of bone grafts put into the infected field remained. It was over 80 per cent. in the acute infections, and that included perhaps all types of bacteria.

Let me mention another point about Lane plates which we have learned to our sorrow. In a case of epiphyseal separation of the head of the humerus in a boy, twelve years of age, we used a Lane plate. We took out this plate two years later and found shortening of the arm of nearly one inch. I believe Lane plates interfere with the growth of bone very materially in the long diameter and in future development. With that in view we worked on rabbits and in a number of them proved conclusively that by putting in the epiphyseal line of rabbits autogenous pegs, we would get no shortening. We have had three cases of epiphyseal separation of the head of the humerus in small children in which we have taken a tibial transplant and driven it through without any shortening. I believe with a large chance of success we can place autogenous grafts in an infected field with a reasonable hope of getting union, which you certainly cannot do with a Lane plate.

Dr. W. B. Coley, New York City.—I agree thoroughly with the last speaker that the pendulum has swung too far in the direction of the operative treatment of fractures.

It has been stated that in 85 per cent. of cases you do not get accurate anatomical apposition, as shown by the

x-ray. The question is, in what percentage of cases can you get sufficiently accurate apposition without operation to give 9000 functional results. I remember one case of fracture of the elbow, in a boy, twelve years of age, in which Dr. Bull and I made two unsuccessful attempts under ether to get fair reduction as shown by the *x*-ray. Dr. Bull advised operation. It was a patient of mine, and I said to him, I advised another trial. We made a third trial under an anesthetic. We got good apposition and the boy is now well, eight years afterward, and has a good arm, so that it would be difficult to tell one arm from the other. These cases should often be treated more than once before resorting to operation.

As regards the periosteum, I do not think the question is entirely settled. The more recent experiments of McWilliams, of New York, are at variance with the ideas of Macewan and Murphy to a certain degree, and seem to prove that the periosteum does have an important part in bone formation. We know a great many fractures do well under the older methods. We do not know how many plates have to come out. We are taking out more and more of them all the time, and the point Dr. Marcy brought out, that by putting in a plate we take away a certain part of the ability of the bone to form new bone, is something worth considering.

Dr. William D. Haggard, Nashville, Tennessee.—In reference to the use of plates many years ago, we were interested in Professor Kummell's clinic at Hamburg. He used silver and ivory plates for fractures twenty-five years ago. They were shown to us by Prof. Kummell. They were also used in this country for a time.

I think some reference ought to be made to the bone inlay because it is so much more easily applied than the peg or dowel, and with a bone in which there is fracture we can take a bone graft out with a double saw and then turn it, so that the point of fracture will be locked. It is simpler than attempting to take it out where you have two bones and you have to break them both, like a green stick, in order to insert the transplant in the medullary canal. The plan of Albee is well known and those who have had experience with it find it is satisfactory.

Dr. O. H. Elbrecht, St. Louis, Missouri.—The remarks of Dr. Haggard have reminded me of a method that has not been mentioned. I would call attention to the method suggested by Dr. P. M. Magnuson, of Chicago, who uses ivory plates. The

method is much the same as the one referred to by Dr. Haggard but with this difference: instead of putting in an autogenous graft an ivory plate is used, it is counter-sunk through a groove made by a double saw and held in place by ivory pegs or screws which are placed transversely through drilled holes in the ends of the fragments.

A side view would be about like this (indicating). Let us say the line of fracture is here. The bone plate is counter-sunk to this point and the dowel pins are placed thusly. These dowel pins are made in several sizes and fit snugly and they do not exert the same amount of pressure as a metal screw and yet they fix the bone fragments in the line of fracture perfectly. The experiments of Dr. Magnuson show that the ivory plates are absorbed within a certain number of months according to size and location, he has also recovered a few plates that were removed from infected areas and they showed beginning absorption. The immobilization is excellent and the method removes some of the objectionable features presented by the metal screws which produce in many instances tissue necrosis from too much pressure on the screws and it was this that led Dr. Magnuson to devise his method. The method referred to by Dr. Haggard is theoretically perfect in that you have a sliding autogenous graft from the site of fracture, but it has always been my impression that this method does not hold the fragments firm enough and you must therefore depend almost entirely on your dressings for the fixation. It is, however, an improvement on the plan of Dr. Murphy, who uses a loose bone graft in the medulla.

Dr. Battle Malone, Memphis, Tennessee.—One point in regard to the suggestion made by Dr. Haggard as to taking the graft from the seat of fracture. I understand that Dr. Turck, of Jacksonville, Florida, has published an article recently in which he advises a sliding transplant.

I have found in these old cases of non-union, which are the ones in which we usually make use of a transplant, there is in many cases a rarifying osteitis, as shown by the *x*-ray very plainly, and I do not think bone at that point is at all adaptable for transplantation. It is much preferable if we take a transplant from some other part of the body. The point Dr. Haggard makes of mortising the transplant in is applicable in many cases, especially in the tibia where we have firm union of the fibula. We do not want to break and separate it so that we can

put in a medullary splint as advised by Murphy. It is an excellent suggestion. Where we have an irregular line of fracture, where there has been comminution and loss of bone substance, we cannot ream out and set in the medullary splint. By mortising them in we get a good result if we take the transplant from a distant point.

Dr. Jackson (closing the discussion on his part).—Most of the bad cases we have to deal with by open operation. There may be considerable deformity. The surgeon does not always get these cases when he wants them. We get them sometimes when we do not want them. Cases of mal-union in which there is overlapping of the fragments and deformity come to the surgeon for correction. The question arises, is it better to operate on such a patient and take chances of infection, later mal-union, or let him go through life as he is? We must be very slow and hesitating in promising these patients what we can do or what we expect. It is not wise for any surgeon to say to such a patient that I can correct your deformity and make you walk perfectly without a limp. Do not promise that to such a patient. Remember, whenever you operate upon a patient who is already known to have lateral rotation or displacement, you will get shortening, no matter if you use a plate. With any osseous medullary transplant, bone inlay, or any other kind of device you can think of, you are bound to exsect the ends of the bone and the greatest difficulty is to get it coaptated. If you get such a fracture which is two months, six weeks, or two or three weeks old, you will find great difficulty in coapting the fractured ends. You have callous fixation of the fragments to each other, and callous fixation of the adjacent soft tissues. The most difficult thing, therefore, is to separate the fragments from the callous union of the soft fascial tissue and the next greatest trouble is traction or getting them into line.

I noticed in the technique of Lane, when he separated all callus six or eight inches and separated the fragments themselves and severed the fibrous material at each end, the tug of war came. He brought the fragments out of the wound, seizing them with long tong forceps and holding them in contact while an assistant made traction, countertraction and extension. The soft tissues stretch and sometimes the vessels rupture and we have to amputate after these operations. I have had experience along this line.

As to fracture of the clavicle, there are some cases that need

operation, and the best method is to use silver wire or phosphobronze wire. It is better than a plate. With the patella you can either suture the aponeurosis or the postero-anterior quadriceps femoris. Wire is safer. Our advice is not to operate upon compound fractures until they have become simple fractures, because all compound fractures are infected and you disseminate infection. It is better to wait until the tissues have been coffer-dammed in the neighborhood; likewise in all simple fractures, one should wait eight or ten days. Callous fixation does not take place until twelve or fourteen days, and if you operate then you can get coaptation without much destruction of the soft tissues.

Dr. MacLean (closing the discussion).—I do not wish to be understood as advocating the use of a Lane plate as the best way of fixing a fracture. There is something wrong with the Lane plate. We have too much trouble after the use of it. I am in hopes that the slight modification which I have advised here will solve that unfortunate phase of the question. As I mentioned in my paper, and as Dr. Trout called attention, he noticed he got a bony deposit on the side of the fracture opposite the point of application of the plate. Bone development is most active at a point furthest-removed from the plate. The point I made in my paper was something was happening at the site of application of the plate to prevent union. It is a question whether it is the irritation of the plate, or the continuation of the separation that does the harm, and prevents union at the site of the plate.

With reference to the operative treatment, there is one rule for operating on a fracture, and that is, operate only when we are as certain as we can be that there is no other way to reduce the fragments and maintain them in fairly reasonable apposition and get a fairly useful limb.

LIGATURE OF THE INNOMINATE ARTERY FOR CURE OF SUBCLAVIAN ANEURYSMS

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The case which forms the basis of this communication was one of spontaneous aneurysm of the axillary artery involving also the third and second parts of the subclavian. The sac was an enormous one, and reached from the scalene muscles above to the axillary outlet below. The axillary portion was many times larger than the subclavian.

Ligature of the innominate artery as a method of curing subclavian aneurysms must always be looked upon as a last resort. It must only be attempted if other methods are unsuitable in the particular case under treatment.

Savariaud[1] divides subclavian aneurysms into two classes: (1) extrascalene; (2) intrascalene, according to the position of the sac. Those belonging to the extrascalene variety can usually be treated without interfering with the innominate trunk, while those belonging to the intrascalene variety will often necessitate ligature of this vessel.

These aneurysms have been treated by the following methods (Savariaud):

I. Direct attack.

(*a*) Open operation. (Antyllus, Matas.)

(*b*) Extirpation.

[1] Aneurysms de la Sous-Clavière, Revue de Chirurgie, 1906, tome xxxiv, p. 1.

II. Indirect attack. (Ligature.)

(*a*) Proximal ligature (of the 3rd, 2d, or 1st part of subclavian or of the innominate).

(*b*) Distal ligature (of 3rd part of subclavian or axillary).

I. Direct Attack. If the proximal circulation can be controlled by a clamp or temporary ligature placed on the subclavian the best method of treating these cases is by *direct attack, i. e.,* by opening the aneurysm (Antyllus), cleaning out the clots and securing the vessels opening into the sac. This part of the operation can be finished according to *Matas'* advice, either by an obliterative or possibly reconstructive aneurysmorraphy. If effective hemostasis can be obtained, the operation is very successful. Matas[1] reports seven obliterative operations with only one death, *i. e.,* 95.4 per cent. of successes. Savariaud speaks very highly of *extirpation* of the aneurysmal sac. He collected 7 cases with one death. It is hardly likely, however, that this operation will survive. Compared with the Matas procedure it is more difficult, and however carefully the dissection is conducted, the collateral channels will be in danger of division.

II. Indirect Attack. (*a*) *Proximal ligature. Ligature of the subclavian artery.*

Ligature of the Third Part of the Subclavian Artery. This is a highly successful operation. It has usually been employed in the cure of axillary aneurysms or in subclavio-axillary aneurysms in which a sufficient length of the third part of the subclavian artery outside the anterior scalene muscle was free from the aneurysmal sac.

The artery is peculiarly suited for the operation. It is easily accessible and is usually free from branches. If a branch happens to arise from this part it is usually the posterior scapular. In extrascalene aneurysms the objective

[1] Trans. Internat. Med. Congress, London, England, 1913; Surgical section, discussion on the surgery of the arterial system.

point should always be the third part of the subclavian. If inaccessible the ligature must be placed further upstream. Savariaud collected 9 cases with only 1 death, which occurred from embolism on the twenty-second day.

Ligature of the Second Portion of the Subclavian Artery. In some cases of extrascalene aneurysm it may be found that no part of the third portion of the subclavian artery is suitable for a ligature. If the anterior scalene muscle is divided and the phrenic nerve retracted, the second portion of the artery can be exposed and tied. As would be expected, this operation is as successful as ligature of the third part, because the ligature is invariably placed below the superior intercostal artery, *i. e.*, below the branches which may be required as collateral channels. Savariaud collected four cases, all successful.

Ligature of the First Part of the Subclavian Artery. Ligature of this arterial trunk has turned out to be a very unsatisfactory operation. It is both difficult and dangerous. The artery is very short, numerous branches arise from it, it is very deeply situated and it is surrounded by important veins and nerves. The internal jugular and vertebral veins are directly in front of it; also the pneumogastric and phrenic nerves. At its origin, the right innominate vein forms an anterior relationship.

In cases of aneurysm the venous trunks are usually greatly distended and block the approach to the artery. The numerous arterial branches hinder the passage of the aneurysm needle. After a ligature has been successfully tied, the obliteration of the vessel is problematical, because clotting is impossible except in the immediate neighborhood of the ligature. If by any chance the wound becomes infected, secondary hemorrhage is very liable to occur at the site of ligature. If on the other hand massive clotting and extensive obliteration of the main arterial trunk occurs, the branches arising from it will become obliterated with serious embarrassment of the collateral circulation.

Secondary hemorrhage (twice in 9 cases) and return of

pulsation (three times in 9 cases) have been too frequently observed to permit the operation to occupy a high place in our esteem. (Savariaud.) If ligature of the first part of the subclavian is contemplated, the site of ligature should always be distal to the origin of the thyroid axis so as to leave the suprascapular artery free to carry blood to the arm. If the ligature is placed proximal to the origin of the vertebral, it would hardly be wise to tie this trunk at the same time, especially if the collateral circulation was already embarrassed by the centrifugal pressure against the walls of the aneurysmal sac. Blood flowing reflexly down the vertebral would probably be needed to supply the collateral circulation when the aneurysm underwent consolidation. The same reflex stream would hardly be powerful enough to prevent consolidation. Ligature distal to the thyroid axis and vertebral would be more likely to be followed by consolidation of the aneurysm.

Ligature of the Innominate Artery. In the treatment of intrascalene aneurysms, ligature of the innominate with or without simultaneous ligature of the carotid is usually the only procedure open to us.

Since the year 1880, the innominate has been tied twenty-six times for the cure of aneurysm of the subclavian artery with twelve recoveries and fourteen deaths.

A table of cases of aneurysm of the subclavian artery operated upon by ligature of the innominate artery since the year 1880 follows:

	Cases.	Recoveries.	Deaths.
Spontaneous aneurysms	23	10	13
Traumatic aneurysms	3	2	1
Total	26	12	14
Ligature of the innominate artery alone	12	5	7
Ligature of the innominate and carotid simultaneously	12	7	5
Ligature of the innominate, carotid, and vertebral simultaneously	2	0	2
Total	26	12	14

The death roll (fourteen deaths in twenty-six cases, *i. e.*, 53.8 per cent.) is enormous, but the disease is almost certainly fatal sooner or later unless treated by surgical means.

The operation is one of last resort and should only be attempted if ligature of the subclavian artery in some part of its course is impossible.

In intrascalene aneurysms no other course is open. The first part of the subclavian is occupied by the aneurysm and inaccessible to ligature. In extrascalene aneurysms it would probably be wiser to attempt to place a ligature on the first part of the subclavian, and failing in this to tie the innominate and carotid.

(*b*) *Distal Ligature.* In the treatment of subclavian aneurysms, distal ligature ought to be given proper consideration particularly in cases where proximal ligature is impossible or inadvisable. Intrascalene aneurysms are often associated with and are part of an aneurysmal dilatation of the innominate. Ligature of the third part of the subclavian and simultaneous ligature of the carotid is the recognized treatment of these conditions and is highly successful. In extrascalene aneurysms, proximal ligature is the procedure of choice. If, however, this is not feasible ligature of the first or second part of the axillary has been successful in curing some of these cases (Barkley,[1] Braun[2]). Monod[3] tied the termination of the third part of the subclavian and the common carotid and cured an aneurysm of the third part of the subclavian. Gèrard-Marchant,[4] successfully tied the carotid and the axillary for the cure of an aneurysm occupying the whole subclavian artery. In cases of aneurysm of large extent prohibiting proximal ligature, it would seem wise to try the effects of distal

[1] New York Medical Journal, 1900.
[2] Deutsche Zeitschr. f. Chirurgie, 1903, tome lxi.
[3] Bull. Acad. Méd. de Paris, 1895, p. 99.
[4] Bull. de l'Acad. de Méd., Août, 1901.

ligature and in the event of failure to use other means. A case reported by Thorburn[1] is one in point. An extensive traumatic aneurysm occupying the whole left subclavian artery was treated by distal ligature of the axillary artery between the second and third portions. Pulsation returned in the sac on the seventeenth day. Electrolysis was employed and a cure resulted.

The site of ligature is important. It should be as near to the aneurysmal sac as possible. Under no circumstances must the ligature be placed distal to the origin of the posterior circumflex and subscapular vessels.

The site of ligature must be above these vessels. If placed below, the circulation of the arm will be imperilled; and further the aneurysmal sac will be in full connection with the collateral circulation from its distal side.

Illustrative Case. A. J., aged forty-six years; male; colored. The patient was a powerful negro who was admitted to the John Sealy Hospital on June 22, 1914, suffering from a large pulsating swelling occupying the right axillary and supraclavicular spaces.

Previous History. The patient was a dock laborer and had daily been accustomed to most strenuous work until about seven years ago. There was a positive history of gonorrheal infection. There was no history of syphilitic infection. He had not been addicted to excesses in alcohol.

Present Trouble. The history of the onset of the axillary swelling was very vague. Painful kernels (lymphatic nodes?) had appeared and disappeared in various part of his body. Six weeks ago a swelling (kernel) appeared in his right armpit. Gradually the tissues in front of the right shoulder were involved. Four days before admission, the arm began to swell, and he suffered from intense pain in the back of the hand and wrist. Before this period he had no knowledge of the existence of a swelling either above or below the collar bone.

[1] British Med. Journal, 1895, i, 909.

On admission, the condition of the patient was as follows: He was a magnificent specimen of manhood, although somewhat emaciated and careworn. His facial expression was eloquent of suffering (see Fig. 1). Occupying the whole axillary space of the right side was a huge swelling which extended upward above the clavicle into the supraclavicular space. The right arm and forearm were greatly increased in size and the skin was stretched and tense and very edematous. Large veins could be seen in the subcutaneous tissue of the arm and forearm. The arm and forearm were swollen and edematous. He complained of almost constant pain of a boring, burning character in the hand and wrist, which was alleviated by raising the shoulder.

The axillary and supraclavicular swellings were continuous. On inspection the outline of the clavicle was obliterated, but it could be palpated clearly. Over the surface of the tumor pulsation of a typically expansile character was visible and palpable. It extended as low as the axillary outlet. The axillary floor was depressed and bulged. The skin covering it was edematous and thrown into creases. The radial pulse was imperceptible. The circulation in the arm was evidently much embarrassed.

Examination of the heart revealed nothing abnormal. There was no undue pulsation in the supraclavicular space. The sternal and clavicular origins of the right sternomastoid were quite prominent, but they did not stand out in relief quite so distinctly as those on the left side. Blood examination showed a leukocytosis of 28,500 and 87.3 per cent. of polynuclear cells. Unfortunately, the red count and percentage of hemoglobin are not recorded. The Wassermann reaction was positive. The urine showed nothing abnormal.

On June 23, under novocain infiltration anesthesia, the innominate artery was ligatured. A transverse incision about two fingerbreadths above the clavicle was carried from the middle of the right supraclavicular space, inward across the insertion of the sternomastoid muscle to the

Fig. 1.—Right subclavio-axillary aneurism.

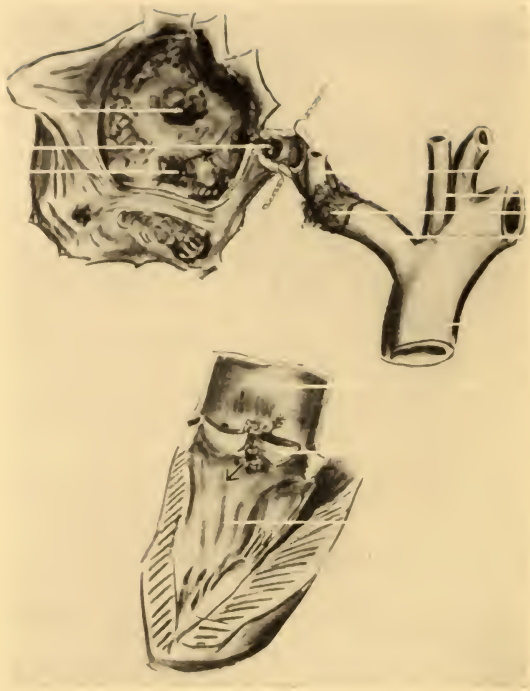

FIG. 2.—Shows the left ventricle of the heart laid open and two of the valves of the heart exposed, viz., the anterior and the right posterior. A perforation (shown by the arrow) is seen in the right posterior valve. Part of the commencement of the aorta shows several patches of atheroma.

FIG. 3.—Shows the remainder of the aortic arch and its branches. Near the bifurcation of the innominate artery the site of ligature is shown. The branches of the first part of the subclavian were unfortunately not dissected out. The sac of the aneurism has been emptied of clot to show the position of the distal opening of the axillary artery.

middle line of the neck. Successive division of the sternomastoid, sternohyoid and sternothyroid gave a clear exposure of the lower portion of the carotid packet of vessels. The scalenus anticus and phrenic nerve were recognized. Following the scalenus anticus downward to the first rib, it was found to fuse with the supraclavicular swelling. Further dissection revealed the fact that the second and third parts of the subclavian artery were involved in the aneurysmal sac and that the insertion of the scalenus anticus blended with the inner wall of the sac. Ligature of either the third or second parts of the subclavian artery was out of the question. Search was now made for the lower portion of the common carotid with the intention of following it down to the bifurcation of the innominate. During the search a somewhat tortuous artery was encountered just above the sternal notch. This was followed downward as a single trunk behind the sternum. Fully one-half inch above the sternum it bifurcated. One branch passed upward and was identified as the right common carotid. The other, evidently the first part of the subclavian, passed downward and backward and entered the lower and inner side of the aneurysmal sac. The carotid trunk seemed unusually small. The subclavian was much larger. It was very short and firmly fixed, and so deeply situated that it seemed unwise to try to identify any of its branches.

The main arterial trunk, which was without doubt the innominate, was carefully cleaned and ligatured. Owing to its accessible position this was an easy task. Before the ligature was tied, the vessel was compressed and pulsation ceased in the aneurysm. The ligature material used was the narrow linen tape employed in obstetrical practice for tying the umbilical cord. (This tape goes by the name of "bobbin" and is about one-tenth inch wide.) Two of these ligatures were tied side by side and the knot finished as the stay knot. (Ballance and Edmunds.) The common carotid was

not tied. After the ligature was tied, not the slightest pulsation was visible in the aneurysms.

No cerebral symptoms followed the operation. The arm became completely paralyzed and anesthetic almost immediately. No pulsation was visible in the aneurysmal sac. The arm still remained edematous. The axillary swelling did not decrease in size. He still complained of considerable pain in the hand and forearm.

Except for complete paralysis of the upper extremity his general condition remained fair, until the middle of July, when he began to complain of pain once more in the site of the old aneurysm. On July 18, a soft fluctuant tumor was discovered, in the floor of the right axillary space. There was still no sign of pulsation in the old aneurysmal sac. On July 21, aspiration revealed the presence of pus. The next day, July 22, a large axillary abscess containing about a pint of blood-stained pus was opened and drained. The cavity continued to drain and the patient improved and gained strength. On August 1, during the night a very profuse hemorrhage occurred from the walls of the abscess cavity. This was stopped by careful packing of the cavity. No further bleeding occurred after the packing was removed and the patient continued to progress favorably, with the exception of two small carbuncles which appeared on his back. Almost a month later, without any warning, the patient suddenly became unconscious. This occurred at noon, on August 29. Cheyne-Stokes respiration made its appearance and he died at 4 P.M., on the same day (sixty-seven days after the operation).

The autopsy was a very complete one. Careful search was made for embolism of one of the cerebral arteries, but none was found. Except for marked cerebral anemia, nothing abnormal was found in the brain.

The Heart. The greater part of the cusp of the right posterior and the contiguous part of the anterior semilunar valves were deeply ulcerated. A large perforation was

found in the right posterior valve. The eroded portion of both valves were adherent to the wall of the aorta just above the sinuses of Valsalva. No thrombus was found in either coronary artery and both lumina were patent. The first part of the aorta showed several patches of atheroma.

The innominate artery was capacious and fairly healthy. It was 5.5 cm. long. The inner coat showed no traces of atheroma. From the left side, just at its commencement, the left carotid trunk took its origin. About 2 cm. below its bifurcation was the site of ligature. Externally, this was covered by a dense mass of scar tissue. Internally, the lumen was not completely obliterated, but admitted easily the end of a fair-sized probe. After slitting the artery up, the site of the ligature was shown by a transverse ridge, the edges of which were ragged and friable. In places the intima was lost, and minute ragged holes were seen which led into the substance of the arterial wall. Portions of the linen ligature could be seen through these apertures. There was no clot on the ragged edges of these small holes. They had the appearance of having been produced mechanically (postmortem) by pulling open forcibly the sides of the artery after it had been slit open.

The arteries were carefully examined on the distal side of the ligature. The carotid was quite normal. The subclavian was a little dilated. At a distance of 2 cm. it passed into the consolidated mass which represented the sac of the aneurysm. On slitting it up, the inner coat was found to be smooth and apparently healthy. After tunnelling the wall of the sac for 2 cm. the vessel opened into the cavity of the aneurysm. The margins of this opening were abrupt, irregular and crenated. The interior of the aneurysmal sac was filled with consolidated clot. This was dark colored near the opening of the artery but white and fibrinous elsewhere. After peeling away a quantity of clot from the interior of the sac, the inner lining of the wall was examined. It was rough everywhere, and no traces of endothelial lining

could be discovered. The clot was so adherent to the wall of the sac in every part and so little of it was red that there was no reason to believe that blood had been circulating through the aneurysmal sac since the ligature had been placed on the innominate.

The distal opening of the axillary vessel was found after the clot had been peeled from the sac. This was situated 7 cm. from the proximal opening. It was absolutely obliterated, being filled with organized clots. Three cm. distal from the sac the axillary artery was patent. The wall of the sac was very thick and was formed by adventitious tissue, in which were incorporated pectoral muscles, axillary nerves, and at its inner aspect scalenus medius and scalenus anticus. The whole sac measured 17 cm. in length and 14 cm. in breadth. Its lower aspect was hollowed out by an irregular cavity consisting of numerous intercommunicating pockets which contained pus (axillary abscess). It was otherwise filled completely with clots, which was everywhere so adherent to the wall that it could only be peeled off by using great force. The aneurysm was completely consolidated.

The line of treatment was finally decided upon during the development of the operation, as it was not possible to tell until the anterior scalenus muscle had been exposed whether the third or perhaps the second part of the subclavian artery could be tied or whether a ligature would have to be placed further upstream nearer the heart.

We had hoped to have been able to have controlled the circulation on the proximal side by clamping the second or third part of the subclavian, and to have completed the operation by opening the sac and performing an obliterative or reconstructive aneurysmorraphy (Matas) as conditions allowed. Owing to the scalenus anticus being incorporated in the wall of the sac, this procedure was abandoned. The first part of the subclavian was very short and inaccessible and eminently unsuited for the application of a clamp. I

did not think it advisable to apply a permanent ligature, because of the unsatisfactory results that usually follow such a procedure. If I could have controlled the circulation through it temporarily and at the same time controlled the circulation through its branches, particularly the vertebral, I should have attacked the aneurysm directly by the open method. But without full control I was afraid that too much blood would reach the aneurysmal sac through these branches to justify such a heroic procedure. It was a great disappointment not to be able to open the sac and turn out the clots, because such a procedure would have relieved the pressure instantly on the tissues outside the aneurysmal sac, and allowed the blood to pass along the collateral channels with greater ease. I was convinced that any handling of the first part of the subclavian was unwise, because of possible permanent injury to its branches, which were necessary to carry on the collateral circulation. Ligature of the innominate seemed the only course to follow. There was no reason to fear for the life of the arm because both the vertebral artery and the common carotid were left intact, and it was confidently expected that enough blood would flow downward along these vessels to keep the arm alive. It was probably wise, in this particular instance, not to have ligatured the common carotid. The collateral circulation outside the aneurysm was seriously embarrassed, and it is quite probable that the vertebral and inferior thyroid alone would have been unable to have supplied the arm with enough blood to keep it alive. The possibility of distal ligature never entered into our calculations. Only the brachial artery was accessible; and ligature of this trunk would have been fatal to the life of the arm. If the third part of the axillary artery had been accessible and a ligature could have been applied *above* the origin of the subscapular artery, a satisfactory result might have followed without imperilling to any great extent the collateral circulation.

Immediate Results of Ligature of the Innominate Artery. The primary object of ligature of an artery is to cut off the blood current through the aneurysmal sac and promote clotting in its interior. If the innominate artery alone is ligatured, there will always be a possibility of blood flowing downward along the carotid of the same side into the subclavian artery. Blood may also reach the subclavian in a reflux manner from the vertebral. A fair amount of blood will also reach it through the anastomotic channels derived from the other branches of the first part of the subclavian.

Under ordinary circumstances there is not much likelihood that the upper extremity will be deprived of its blood supply to a degree sufficient to jeopardize its vitality. Rather is there a fear that too much blood will flow through the aneurysmal sac and that consolidation will not occur. With this possibility in view, some surgeons place a ligature on the common carotid while others obliterate both common carotid and vertebral at the time of the primary operation on the innominate. It would appear, however, from theoretical considerations that these additional ligatures would place the circulation of the upper extremity in greater jeopardy. If consolidation of the aneurysm occurs no blood can pass into the upper limb by the direct route (*i. e.*, *via* the subclavian artery, the aneurysm and the axillary artery). It must pass by the anastomoses. A study of the anastomotic channels should be made under two conditions: (1) With the carotid and vertebral still patent; (2) with one or both of these arteries tied. In the *former* the first part of the subclavian remains an active part of the direct arterial system owing to the large quantity of blood flowing backward into it along the lumina of the carotid and vertebral arteries. Blood passes freely into its branches and if consolidation occurs in the aneurysm, the suprascapular, possibly the posterior scapular, and the superior intercostal

arteries will serve as the chief anastomotic channels to carry blood into the branches of the axillary artery below. In the *latter* condition, where one or both arteries are tied, the first part of the subclavian is partially or completely cut off from the arterial system. It is true, after ligature of both arteries, that a feeble trickle of blood may reach it as a reflux from the inferior thyroid; but there will not be enough to fill the suprascapular which is perhaps the most important of all the anastomotic trunks. In such a case the circulation of the upper limb will be greatly imperilled for it is hardly to be expected that in a large axillary and subclavian aneurysm the anastomoses between the thoracic branches of the axillary artery and the intercostal arteries would suffice to carry enough blood to the arm. Therefore, it would appear to be a dangerous procedure to add to a ligature of the innominate, simultaneous ligature of both carotid and vertebral. One of these trunks should be left free to carry blood into the first part of the subclavian and its branches. The vertebral alone seems able to supply this want, as simultaneous ligature of the innominate and carotid have been performed many times without seriously affecting the vitality of the upper extremity.

What effect will the additional ligature of the carotid have on the cerebral circulation? Ligature of the innominate artery alone cuts off the direct flow of blood to the right side of the brain through the internal carotid and vertebral arteries. Not only does the current in these bloodvessels toward the brain cease, but a reverse current starts in them toward the upper extremity which is in sore need of blood. In this manner, some of the blood circulating through the circle of Willis is diverted from the right side of the brain, and instead of passing terminally in full bore along the terminal cerebral branches of the carotid and vertebral, reaches the nervous centres in less volume. It would be much better for the cerebral circulation if this loss could be prevented; and, arguing from a theoretical

standpoint ligature of the common carotid and vertebral would benefit the cerebral circulation.

From the above facts we may conclude that ligature of the carotid serves a double purpose, viz., (1) to diminish still further the flow of blood through the aneurysm and promote consolidation; (2) to prevent an excessive drain of blood from the circle of Willis and avoid cerebral anemia. Therefore, it may be concluded safely that the practice of simultaneous ligature of the innominate and the right common carotid is founded on sound reasoning.

Status of the Operation. I have been able to find authentic references to fifty-two cases of ligature of the innominate artery in which there were sixteen recoveries, *i. e.*, 30.7 per cent. The information has been gleaned mainly from three papers, one by Sheen, published in 1905, in which he collected 36 cases; another by Burns[1] in 1908, who added 7 more; a third by Hamann, in 1904, who added 7 more. In addition I have been able to find references to 1 other case beside the one reported above, making 2 more.

As far as the histories of the cases enable us to judge, out of the 52 cases collected, there were 41 cases of spontaneous aneurysm, 6 cases of traumatic aneurysm and 5 cases of wounds of the large arterial trunks. The recoveries were distributed as follows:

	Cases.	Recoveries.
Spontaneous aneurysms . . .	41	12
Traumatic aneurysms	6	2
Wounds of arterial trunks . . .	5	2
	52	16

It is interesting to note that the two recoveries in traumatic aneurysms were reported in 1906, by a Japanese

[1] Burns in his paper claims to have collected 10 new cases. Two of his cases, viz. by G. H. Porter and T. Annandale in Table 4, p. 1674, had been reported previously by Sheen in his table of "cases of attempted ligature," p. 23. A third case attributed to Miles (also in Table 4), I have been unable to find and have therefore not thought it wise to include it.

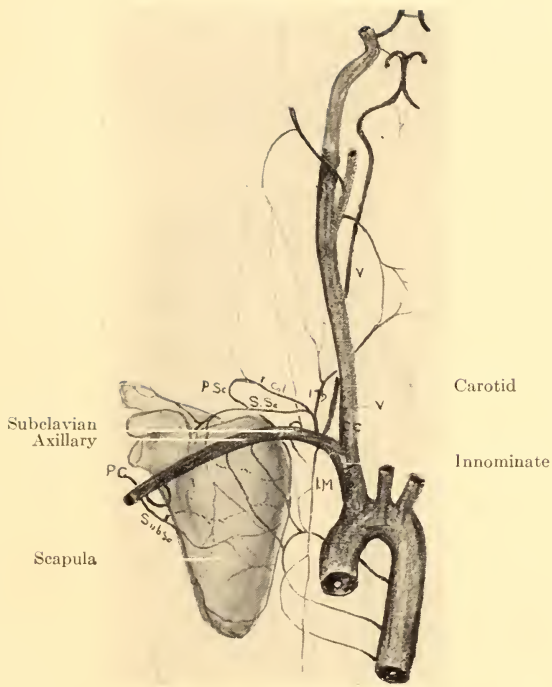

Fig. 4.—Diagram showing arterial anastomosis around the scapula. *CC*, common carotid (right); *V*, vertebral; *I.M.*, internal mammary; *I.Th.*, inferior thyroid; *T.Col.*, transversalis colli; *P.Sc.*, posterior scapula; *S.Sc.*, suprascapular; *Sub.Sc.*, subscapular; *P.C.*, posterior circumflex.

surgeon "Saigo." One case was a traumatic aneurysm of forty days' duration, of the right common carotid artery, resulting from a gunshot wound. Ligature of the innominate failed to cure the aneurysm. Nine months later the aneurysm was cured by excision. The other case was a traumatic aneurysm of the right subclavian. Ligature of the innominate seems to have been successful, but neuralgic pains persisted. The case was eventually cured by excision of the aneurysmal sac after double ligation of both subclavian artery and vein on each side of the sac.

The recoveries after wounds of arteries comprise two cases. The one reported by Lewtas (Sheen No. 28) was a wound of the subclavian, caused a month previously by the bursting of the breech of a rifle. The piece of steel was lodged above the clavicle. There had been bleeding from the wound three days before admission. When the steel was removed a profuse hemorrhage occurred. This was stopped by pressure. The innominate and carotid were tied and bleeding ceased. The other reported by Hernandez gives very meagre details. An injury was received at the origin of the right carotid which necessitated ligature of the innominate. Recovery followed.

Careful analysis of all the cases reported seems to show that simultaneous ligature of the carotid and innominate is followed by a smaller mortality than ligature of the innominate alone.

The following summary explains this in a graphic manner

Summary of Total Number of Cases

	Cases.	Recoveries.	Deaths.
Ligature of the innomate alone . .	35	7	28
Ligature of the innominate and carotid simultaneously	15	9	6
Ligature of the innominate, carotid, and vertebral simultaneously	2	0	20
Total	52	16	36

As a large number of these cases (21 in number) were reported before the year 1880, I have analyzed the cases published since that date, which we may presume fall in the antiseptic period.

The results are more striking even than the former.

SUMMARY OF CASES OPERATED UPON SINCE THE YEAR 1880

	Cases.	Recoveries.	Deaths.
Ligature of the innominate alone . .	17	7	10
Ligature of the innominate and carotid simultaneously	12	8	4
Ligature of the innominate, carotid, and vertebral simultaneously	2	0	2
Total	31	15	16

It will be seen that the percentage of recoveries after ligature of the innominate alone is 41.2 as against 66.6 per cent. after simultaneous ligature of the innominate and carotid. Simultaneous ligature of the three trunks seems to have been very disastrous. It is probably rather unwise to draw hard-and-fast conclusions from the figures shown above, because so many factors enter into the causes of success and failure that cannot be gleaned from any published case. So much depends on the pathological condition of the artery tied, the state of the collateral circulation, the dexterity of the operator, the cleanliness of the operation and the condition of the patient, that statistics must be accepted with the greatest caution.

ABSTRACTS OF ALL CASES REPORTED SINCE SHEEN'S ARTICLE WAS WRITTEN

36. William Sheen, 1905. *Annals of Surgery*, July, 1905. Patient was admitted into Cardiff Infirmary in February, 1904. Age, forty-six years. Alcoholic, but no history of venereal disease. Occupation a laborer. Had previously served in the army.

Diagnosis. Spontaneous aneurysm of the right subclavian artery, mainly occupying the third part.

Operation, March 31, 1904. An attempt was made to secure the first part of the subclavian artery through a vertical incision near the middle line. The common carotid was identified and followed downward. The pleura was wounded (?) and ligature of the first part of the subclavian abandoned. The innominate was tied with floss silk, two ligatures being used side by side (Ballance's stay knot). The common carotid was also tied. Pulsation in the aneurysm ceased at once. The patient was restless for two days, but eventually made a good recovery. Pulsation returned in the aneurysm on the day following the operation. Its intensity varied from time to time, but never became so forcible as before the operation. The pain down the arm and the other pressure symptoms continued. The *second operation* was performed on May 19. An attempt was made to ligature the innominate on the cardiac side of the first ligature. An alarming gush of blood caused the operation to be abandoned. The *third operation* was performed on June 2. The scalenus anticus was identified and its outer edge carefully dissected. A small healthy portion of the subclavian artery was exposed between the muscle and the upper part of the aneurysm. The phrenic nerve was retracted and the outer part of the scalenus anticus was divided. Two ligatures were then placed on the artery proximal to the aneurysm, one on the second part of the subclavian, the other on the third part, close to the aneurysm. Pulsation ceased and the patient was entirely cured.

37. Gay, G. M., 1897. (*Boston Med. and Surg. Jour.*, 1897, cxxxvii, 73.) Female, aged thirty-nine years.

Diagnosis. Spontaneous aneurysm involving the innominate, carotid and subclavian arteries of two years' duration. The innominate artery was tied with three braided-silk ligatures placed at different levels. The wound became septic and secondary hemorrhage occurred on the thirty-

second day. The common carotid artery was tied but no effect was produced on the bleeding. The patient died ten days afterward.

38. Harte, Richard H., 1897. (*Annals of Surgery*, Philadelphia, 1897, xxvi, 488.) Male, aged twenty-six years. Patient had received a pistol wound of the neck, the bullet entering about one inch above the inner end of the left clavicle. There were evidences of injury of the fifth cervical nerve. The bullet was located on the right side of the neck in front of the cervical vertebra. The bullet was removed by an incision along the posterior border of the right sternomastoid. It lay alongside the esophagus and behind the origin of the right common carotid artery. On the third day, swallowed fluids regurgitated through the wound. On the eleventh day, bleeding occurred which was controlled. Two days afterward severe hemorrhage occurred. A search was made for the bleeding point. The opening appeared to be on the posterior side of the right common carotid. A ligature was placed on the carotid proximal to this apparent opening but the bleeding still continued. The clavicle was dislocated and the innominate searched for. Before ligating this vessel another ligature was placed on the carotid close to its origin. This stopped the bleeding. Ten days later another hemorrhage occurred. The innominate was exposed and ligatured just before it bifurcated. The carotid and subclavian were also ligatured. The patient died in a few hours. (The position of the ligature placed on the carotid and subclavian in the last operation is not clear. The account of the postmortem examination does not give any information as to the bloodvessel originally wounded.)

39. Moynihan, B. G. A., 1898. (*Annals of Surgery*, Philadelphia, 1898, xxviii, 1.) Male, aged thirty-one years.

Diagnosis was spontaneous aneurysm of the third part of the subclavian artery. On December 8, 1897, the aneurysmal sac was excised. This was accomplished apparently

without any injury to the subclavian vein. To facilitate the operation, the clavicle was divided in two places and the middle half thrown down. Unfortunately, the wound became infected. On December 20, there was an escape of an ounce of blood. A suppurating axillary gland was opened on January 9, afterward the case progressed favorably, until February 6. On this day a hemorrhage occurred under the flap raised in the original operation. Bleeding was checked by a pad and bandage. On February 8, a fresh hemorrhage occurred. Exploration of the subclavian triangle revealed a large clot of blood. On clearing this away, a terrific hemorrhage resulted. The innominate and carotid were tied with silk ligatures. Death occurred in about an hour. The postmortem revealed a rupture of a second aneurysm which existed on the posterior wall of the first part of the subclavian about one inch from the end of the ligatured vessel.

40. Schumpert, T. E., 1898. (*New York Medical Record*, September 3, 1898, p. 337.) Female, aged forty-two years.

Diagnosis. A spontaneous aneurysm arising probably from the termination of the innominate. A braided-silk ligature, No. 8, was tied around the innominate artery proximal to the aneurysm. The patient died of cerebral anemia on the ninth day after the operation.

41. Hernandez, Alberto, 1900. (*Wien. med. Blatt.*, 1900, xxiii, No. 35, p. 559.) For an injury at the origin of the right common carotid the innominate artery was ligatured with a successful result.

42. De Laup, S. P., 1901. (*Philadelphia Med. Jour.*, January 26, 1901, vii, 171.) Male, aged fifty-eight years.

Diagnosis. Subclavio-axillary aneurysm of the right side. The operation was performed on June 16, 1900. The entire third portion of the subclavian artery was occupied by the aneurysm. Excision of the inner end of clavicle and sternum revealed a fusiform aneurysm of the innominate in addition. The innominate artery was ligatured about one inch from

its origin. Two ligatures of kangaroo tendon and one of braided silk were used. Death occurred on the operating table.

43. Burns, W. B., 1908. (*Jour. Amer. Med. Assoc.*, Nov. 14, 1908.) Male, aged twenty-seven years.

Diagnosis. Spontaneous aneurysm occupying the third part of the right subclavian artery. The hand and arm were edematous and numb. He complained of severe pain in the shoulder.

Operation, August 9, 1907. The innominate artery was exposed by the Mott incision and tied with thick, braided silk (pedicle silk) at a point about one inch proximal to its bifurcation. Pulsation ceased immediately and did not return. The wound suppurated. On August 22, a hemorrhage occurred from the wound which was controlled by packing. On August 24, another small hemorrhage occurred. On August 26, this was repeated. After this, convalescence was uneventful. On September 30, the *silk ligature was removed from the wound.*

44. Saigo, K., 1906. (*Deutsche Zeitschr. f. Chir.*, lxxxv, ss. 577–640.) Patient was a male, aged twenty-two years. He was shot in the neck on October 14, 1904. An aneurysm developed in the common carotid artery. On November 23, 1904, the operation was performed. After resection of the inner end of the clavicle and part of the sternum the innominate artery was tied. The aneurysm reappeared. On August 11, 1905, the common carotid artery was tied above and below the aneurysm, which was then resected. Cure.

45. Saigo, K., 1906. (*Deutsche Zeitschr. f. Chir.*, lxxxv, ss. 557–640.) Case of a male, aged twenty-five years. Shot above the right clavicle on March 5, 1905. A traumatic aneurysm developed. On April 6, 1905, the innominate artery was ligatured in two places and divided between the ligatures. Aneurysm was not cured and pains continued. On August 4, 1905, the aneurysm was excised

after ligature of both subclavian artery and vein, proximally, and distally. Recovery.

46. Myles, Sir Thomas, 1907. (*Dublin Jour. Med. Sci.*, cxxiv, 474, 475.) Case of a male, aged twenty-nine years.

Diagnosis. Spontaneous aneurysm of the right subclavian artery.

Operation. Ligature of the innominate artery and simultaneous double ligature of the common carotid with division of the trunk. Bleeding occurred into the wound ten days after operation. The bleeding vessels (not identified) was ligatured. Repeated hemorrhage, suppuration. Death one month after the operation. Autopsy showed that hemorrhage was from carotid artery.

47. Sargent, P., 1911. (*Lancet, London,* May 16, 1911, p. 120.) Woman, aged sixty-seven years.

Diagnosis. Spontaneous aneurysm of the first part of the right subclavian artery or of the innominate at its bifurcation. Operation, September 14, 1909. After removal of the greater part of the right half of the manubrium sterni and part of the right first costal cartilage, the innominate artery was exposed without difficulty. The ligature consisted of floss silk tied in a "stay" knot. The common carotid was also tied at the level of the cricoid cartilage, No. 2 braided silk being used. Pulsation in the aneurysm ceased at once. No cerebral symptoms were noticed. On the sixth day slight pulsation reappeared in the sac. On the ninth day pulsation disappeared. On the tenth day weakness in the left arm and face were noticed for the first time. No loss of power was noticed in the left leg. The weakness soon passed away. The patient was seen in June, 1910, and was in fine condition. No weakness was found in the arm, face or leg, and no pulsation was found in the aneurysm. She remained well until the early part of 1911, when she died of chronic nephritis and pneumonia. The pathological specimen was obtained and it showed complete obliteration of the innominate and carotid between the

ligatures and obliteration of the first part of the subclavian almost as far out as the origin of the vertebral.

48. Ballance, C. A., 1912. (*Proc. Roy. Soc. of Med., London Clin. Soc.*, v, 99.) Case of a male, aged forty-three years.

Diagnosis. Spontaneous aneurysm of eighteen months' duration of the right subclavian artery. Operation. Ligature of the innominate artery with two strands of kangaroo tendon. During operation it was found that the aneurysm covered the first part of the subclavian which was inaccessible. Recovery.

49. Ballance, C. A., 1912. (*Proc. Roy. Soc. of Med., London Clin. Soc.*, v, 99.) He mentioned, during the discussion of the case above reported, another which came under his care two years previously suffering from a large right subclavian aneurysm. It suddenly began to extend. Part of the manubrium was resected and the right clavicle and first and second ribs were divided. The aneurysm overlapped the innominate artery which, however, was ligatured. Pulsation in the aneurysm ceased immediately. While getting ready to close the wound, the aneurysmal sac burst and there was a sudden gush of blood. A finger was passed into the sac and the hole plugged. Finally the sac was plugged with gauze. The patient died on the following day.

50. Hamann, Carl A., 1914. (*Annals of Surgery*, June, 1914, p. 962.) Woman, aged sixty-eight years.

Diagnosis. Spontaneous aneurysm of the third part of the right subclavian artery. No disturbance of circulation except pain and paresthesia. First treatment consisted of the insertion of eight inches of fine silver wire into the sac. No improvement followed. Operation was performed on February 10, 1913. The aneurysm was exposed and was found to involve mainly the third part of the subclavian, and to encroach also on the second and part of the first portion of the artery. The innominate was exposed after resection of two inches of the inner end of the clavicle. A

heavy, braided, double-silk ligature was placed about half an inch below the bifurcation and tied with an ordinary surgical knot. The common carotid was tied about an inch above its origin with No 2 chromicized catgut. No unfavorable circulatory troubles made their appearance after the operation. The wound healed by first intention. The sac became consolidated and firm. Cure was complete thirteen months later.

51. Morrison, Rutherford, 1914. (*British Journal of Surgery,* April, 1914, p. 725.) Male, aged fifty-one years. *Diagnosis.* Spontaneous aneurysm of the third part of the right subclavian artery. There was excruciating pain in the shoulder, with numbness and loss of sensation down the right arm. There was edema and venous engorgement of the arm and forearm. Operation July 20, 1912. The intention was to put a temporary ligature on the innominate and treat the aneurysm by the Matas method. While cleaning the innominate, a hole was accidentally torn in its outer side. The vessel was then tied below this with soft, thick silk ligature. The right common carotid was tied with catgut. A piece of fascia lata taken from the thigh was wrapped around the ligatured vessels. After the operation pulsation ceased and the agonizing pain had gone. There was complete anesthesia and paralysis of the arm. This gradually passed away.

52. Thompson, James E., 1914. Case reported in this communication.

DISCUSSION

Dr. Joseph C. Bloodgood, Baltimore.—I am sorry I cannot add anything to the aneurysms of the type, but in the last few months I have gone over the literature of traumatic aneurysm from the experience of all the wars to the recent war, and there are some remarkable conclusions from this experience which are of practical value to those who do not see many case of aneurysm, either traumatic or otherwise.

Dr. Thompson mentioned in the beginning of the discussion that possibly the oldest treatment of aneurysm was the best treatment that could be undertaken. In the first place, aneurysms from bullet wounds cannot always be recognized at the time of the injury. There is not much more than a hematoma, nor is there always pulsation, but the consensus of all observed cases and from the results show the best treatment was to check the circulation above the aneurysm, if possible, by Esmarch, or direct exposure of the artery with a temporary clamp, then cut down upon the aneurysm or hematoma, turn out all clots with gentleness, ligate the upper artery, and then clamp the lower artery; then the temporary clamp on the upper artery is taken off in order to see whether there is collateral circulation. After waiting a few minutes, if you will take off the temporary clamp on the lower artery, if it bleeds, your operation is sufficient —ligation of the two arteries and evacuation of the clot. The advantage of this, as pointed out by Dr. Thompson is that there is no disturbance of the circulation. It was surprising how in the great majority of cases the lower artery bled and nothing more was necessary.

In the large group of three hundred or more cases I went over, it was found necessary to transplant the vein between the ends in three cases only. This difference between war experience and the experience of surgeons later is due to the fact that these cases came under observation very early, and the older view of waiting for improvement of collateral circulation does not seem borne out. It does not seem to make much difference whether the cases were arterial aneurysms or arteriovenous aneurysms, the method of treatment was the same and the uniform results were good if patients were operated on between the second and third week.

Dr. J. Garland Sherrill, Louisville, Kentucky.—Dr. Thompson has covered this subject very well indeed. There is one point I wish to call attention to, and that is, in distal ligature for subclavian aneurysm it has been my experience that you may attain almost complete clotting of the blood; yet the tension from the heart's action behind the ligature will in almost every instance dilate the sac, so that the patient finally dies as a result of the aneurysm. I recall one patient who died four months after ligature on the distal side.

The suggestion of the essayist, that we tie the carotid perhaps has some force, and still I am inclined to believe that the patient

will do almost as well without it. I do not believe that the blood running through the brain in a large trunk, such as the carotid affords, would cause anemia of the brain. In an aneurysm in this region you can check the flow of blood in the sac as much as necessary by ligature of the smaller vessels leaving the sac. I believe the innominate should be tied by preference for subclavian aneurysm on right side when it can be safely done. If the sac is not too close to the main trunk, I think this should be done in preference to distal ligature.

Some years ago I reported to this Association a method of opening the chest for ligature of the left subclavian in the third part of its course. It was based, however, upon an erroneous diagnosis, and all we could do was to wire the aneurysm of the aorta which had two sacs. The skiagram was deceptive, but after studying it subsequently I saw where we made a mistake. Ligation of the subclavian in its third portion by the removal of three ribs posteriorly is a comparatively easy operation.

The remarks of Dr. Bloodgood concerning the treatment of arteries in recent wounds are very interesting. I have had some experience in this work, having sutured the brachial at the elbow, and my colleague, Dr. Owsley Grant, has sutured the axillary twice for traumatism. The restoration of circulation in my case was exceedingly prompt. After employing heat for three hours the circulation was not restored, there was no pulsation at the wrist, and while I was unable to get pulsation after suture at the wrist, the skin color was immediately restored. The lower segment of the artery did not bleed, and Dr. Bloodgood's point is well taken, and that should be our guide in making distal ligature.

Dr. J. S. Horsley.—The two chief dangers from ligation for aneurysm of the aorta or one of its large trunks, as the innominate, are failure of the heart and hemorrhage. The great increase in blood-pressure caused by the ligation, increases the work of a heart which is probably none too competent. The second danger is hemorrhage. In the case of the innominate, there is the additional danger of cutting off the circulation from the brain. I have never done a ligation of the innominate and I have no right to discuss the subject from the standpoint of experience, but I would like to ask Dr. Thompson what he would think of partly constricting both the innominate and the carotid by fascia, or infolding, as suggested by Matas and Allen, or by a metal band? The postmortem shows that Dr. Thompson's

case was cured of the aneurysm, though at the point of ligation there was a small lumen. A constriction of the innominate and of the carotid, as suggested, would not increase the blood pressure as much as the ligature would, and would so obviate the strain on the heart, permit a small current of blood to go to the brain, and at the same time might reduce the flow of blood through the aneurysm sufficiently to cause a cure.

Dr. W. B. Coley, New York City.—I have had no personal experience with ligature of the innominate. I saw Mr. Chase Ballance ligate the innominate for aneurysm in 1911. It was a beautiful operation. The patient made a good recovery and was alive when I last heard, about a year later.

In regard to the collateral circulation, it may be interesting to you to state that within the last six months I have tied the subclavian in two instances in order to lessen the blood supply of an extensive inoperable sarcoma of the upper end of the humerus. The tumor was the size of an adult's head. I was rather persuaded to do the operation against my own judgment, as I found gangrene, but the operation of tying the subclavian is extremely easy.

The first case was one with a large tumor. The patient has a temperature following the operation of 102 degrees to 104 degrees. This kept up for two or three weeks. Finally, circulation was restored, but the patient died from a recurrence of the tumor three or four months later.

In the other case the tumor was not so large. It was a rapidly growing sarcoma of the humerus. In this case the circulation was restored under the use of toxins, and the *x*-ray showed a considerable diminution in size. I removed the entire upper extremity. Within four or five months metastasis has taken place, and this patient will probably die in a few months. In both cases I divided the clavicle by means of a Gigli wire saw which made an easy access to the subclavian.

Dr. Thompson (closing).—In answer to Dr. Sherrill's remarks on the question of distal ligature, I do not think it is the general experience of surgeons that distal ligature is such a failure as Dr. Sherrill would have us believe. On the contrary, I think the experience of most surgeons is that distal ligature is quite satisfactory where it is performed in suitable cases.

About two years ago, I remember performing a simultaneous distal ligature of the common carotid and the third portion of the subclavian artery for innominate aneurysm. The result

was a decided success. Slight pulsation could be noticed in the aneurysm for about ten days. In two weeks' time the cure was absolute. The patient remained under observation for two months.

French surgeons have long advised and carried out ligature of the third portion of the subclavian and ligature of the common carotid artery for intrascalene aneurysms of the subclavian. Distal ligature of the third part of the axillary artery is a very satisfactory operation for the cure of certain aneurysms occupying the third part of the subclavian and the upper portion of the axillary vessel. In the face of all this evidence as to distal ligature, we must look upon it in a much more favorable light at the present time than in the past.

As regards the remarks of Dr. Horsley, in reference to partial occlusion of the innominate artery, there is much food for thought. The case reported by me was not partially occluded. The ligature was tied very tightly and the lumen of the artery was completely obliterated. The small lumen which existed at the time of the postmortem must have occurred at a later date.

THE SURGICAL SERVICE OF THE CIVIL WAR THEN AND NOW—THE PROGRESS OF FIFTY YEARS

By Henry O. Marcy, A.M., M.D., LL.D.
Boston, Massachusetts

Military surgery has not generally been considered conducive to the advancement of Medical Science. The history of every great campaign, however, from the earliest periods, has furnished lessons of great profit. They have been interwoven into the warp and woof of medical literature until, little by little, this knowledge has become a leaven in medical lore, gradually lost among the contributions of the centuries.

Early records of Assyrian history give evidence of the great care taken in the preservation of the health and welfare of the soldier. Homer is not forgetful of the skill and ability of the surgeon in the great Trojan War. Egyptian surgery faintly foreshadows our modern aseptic treatment of wounds. The military surgeon of the Roman armies occupied a position of respect and honor, and his services were of the highest value to the legions which conquered Gaul and dominated Britain. One of the most beautiful frescoes of Pompeii is the binding up of the wound of a Roman soldier by his surgeon.

The surgical instruments of that day were by no means the crude affairs generally accredited to the period. The parable of the good Samaritan making use of oil and wine in the dressing of a wound is illustrative of the surgical practice of the Christian era.

Ambroise Paré was a young military surgeon to whom the world owes a debt of gratitude that is difficult to overestimate. An officer-friend was brought to him on the battlefield in great danger from an uncontrollable hemorrhage. Unfortunately, as he thought, his cautery instruments were not at hand. In the inspiration of the moment he tied the artery. As the result of this experience, by a slow process and under much criticism, was elaborated the better method of ligating arteries which is in use today.

The Napoleonic campaigns made valuable additions to military surgery; not the least was the putting in practice of sanitary precautions which aided materially in the amazing success of the French armies. Vaccination for the prevention of smallpox was still a subject of question and doubt even in England. Only a dim perception of this dread malady belongs to our general knowledge at the present. Napoleon ordered every soldier under his command to be carefully vaccinated, thus practically eliminating smallpox from the French armies. The disease continued to be a large element of injury to his opponents. Somewhat recently an unpublished anecdote of creditable authority has been furnished me of this greatest of all military leaders. A letter was handed Napoleon as he entered his carriage, taking his seat beside Josephine. It bore the hated postmark of England. Unopened, he stamped his foot upon it in expression of his bitter feeling. Josephine picked up and read the letter saying, "But see, it is from Jenner who seeks aid for a captured English officer, his friend." Said the Emperor, "It shall be granted; anything within my power shall be given to this distinguished man in recognition of his services to the world."

Baron Larrey was the surgeon-general of the French armies and a member of Napoleon's staff and military family, a recognized authority in all matters pertaining to medical and surgical control. It is not generally known that Napoleon was an epileptic, as indeed have been some

of the most brilliant men of history. It is hard to imagine how the nation welcomed his escape from Elba. The rapidity with which the great forces were reassembled under his marshals to vindicate the honor of France proves his personal power. The campaigns of contending armies over the same ground today—an even mightier struggle for world supremacy—beggars imagination.

The plan for the battle of Waterloo had been accurately defined. The great army slumbered, filled with the inspiration of victory on the morrow. Napoleon ordered the march to commence at four in the morning and himself to be awakened as its personal leader. That night he had a severe epileptic seizure and Baron Larrey permitted him to sleep until six. Who shall say that the destiny of Europe, that day held tremblingly in the balance, was not decided adversely to Napoleon by those fateful two hours!

In the regeneration of France which slowly followed, largely due to the medical history of the Napoleonic campaigns and the men who served in them, Paris became the centre of medical teaching. She held this leadership until a generation ago. The German Universities next became centres of medical science and welcomed to their halls the advanced pupils of the world. This rivalry of scholastic attainment between England, France, and Germany, quite as much, perhaps, as commercial interests, has been one of the sources of national jealousy and a potent factor in the present European War. Dr. Oliver Wendell Holmes told me of his personal knowledge of Baron Larrey when he was himself a student in Paris. Larrey taught the closing of a simple wound and leaving primary union to nature.

The Crimean War which followed, with its horrid trail of disaster, suffering, and death, furnished valuable experience; perhaps the largest service to humanity was the methodical system of nursing introduced and in part established by the immortal Florence Nightingale. From her work have arisen our modern schools of graduate nurses.

Our own war between the States, a sanguinary contest rarely equaled, dragged its four weary years along, leaving as a result desolation, poverty, and suffering seldom witnessed, in which nearly 5,000,000 of the best youth of all the States were engaged. We bear it still in painful memory. To the North it came with the same unexpected suddenness as the present European War—a whirlwind tempest of irresistible power, still vivid in the remembrance of living participants! It is true that there were evidences of impending strife, but few dreamed that it could be of great importance. While yet an undergraduate, in 1857, I took part in a drama entitled "Breaking up of the Union," in which, as the senator from South Carolina, I introduced the bill for dissolution. I declared we would no longer endure the insults and indignities heaped upon us by the North. In 1859–60 I was associated with the late United States Surgeon, George A. Otis, the author of *The Surgical History of the Rebellion.* He then resided opposite the armory in Springfield. He was a native of Virginia, was exceptionally well educated, in this country and in Paris, and for some years had been the editor of the *Virginia Medical Monthly* at Richmond. Although a loyal son of the South, he was a Union man. I shall never forget his calling me to the window one day and saying: "Why don't you men of the North wake up?" as he pointed to a procession of teams transporting the 100,000 rifles of the latest pattern which Secretary Floyd had ordered sent to the Southern arsenals. "You may not believe it, but that means war," was his comment.

On the morning after the firing on Fort Sumter I called upon Dr. D. Humphrey Storer, then Dean of the Harvard Medical Department, upon business pertaining to the Medical School. He at once broke in excitedly—"Great God, Doctor! Would you believe it? South Carolina fired upon our flag yesterday." Only the passing few men of the present can know the great tidal wave of intense feeling

which swept over both the North and the South. As an illustration I quote the story told by an eye-witness of the first recruiting meeting held in Chicago:

Dr. Nathan S. Davis, founder of the American Medical Association and probably the most eloquent speaker the medical profession has furnished America, was then in the prime of his manhood and was recognized as one of the first citizens of Chicago. In politics he had been a democratic leader and insisted upon a peaceful settlement of our national difficulties. He was believed to be a relative of Jefferson Davis. A warrant had been issued for his arrest. The great meeting in the large crowded hall was presided over by the mayor. The platform was filled with distinguished citizens. The hall was festooned with the Stars and Stripes, the table and the secretaries in front were prepared for the enrollment. Violent speeches had been made and excitement was at fever heat when the tall form of Dr. Davis was seen pressing to the footlights as he demanded a hearing. "I know, fellow citizens, that I am denounced as a traitor and that a warrant has been issued for my arrest. You know that I have been a life-long Jeffersonian Democrat. I glory in the fact. I have counselled peace, but when men deliberately fire upon that flag there is no longer a discussion of peace. It is the arbitrament of arms. At the moment I cannot leave for the front, but I promise the volunteers from this city who may place their loved ones in my keeping that they shall receive my most tender care. I am comparatively poor in this world's goods, but I own a corner lot (designating the location) free from encumbrance. To the first man who signs this roll of honor as a defender of his country I present him the deed." It is hard to imagine the excitement and confusion that followed. It is needless to add that Dr. Davis' loyalty was never again questioned.

The saddest picture of the war which I saw was in the seven days' battle of the McClellan campaign. I shall

never forget a shipload of wounded soldiers which we took under a flag of truce from City Point, James River, to Philadelphia. For three long weeks they had bee nin Libbey Prison. Their clothing was still stiff with the blood of the battlefield, their undressed wounds were swarming with maggots, and their pale, hollow cheeks, gaunt from pain and lack of food and care. The senior surgeon in charge, whose name I have forgotten, ordered all the wounds injected with spirits of turpentine and covered with a free dressing of pulverized Peruvian bark. The antiseptic effect was clearly marked. I contrast the picture with that of the siege of Charleston where our troops were in permanent camp. Here I had the opportunity of putting into practice the instructions of our Surgeon-General, William A. Hammond, later court-martialed for irregularities pertaining to his high office. Duties which had been improperly discharged by his assistants, while he himself was engaged in writing a book especially devoted to the sanitation of camps and the care of troops, formed the basis of the charges against him.

We had at Charleston an active force of about 15,000 men encamped upon Folly Island, to act in large measure as a reserve to the army in the bombardment of the city. The island was practically free from malaria. The water was brackish, sea water filtered through the sand, disagreeable to the taste, but we found that, boiled as coffee, it was not especially objectionable. I established cook-houses under strict medical supervision and ordered that nothing should be eaten or drunk that was not issued from them. The sutlers gave us some annoyance, but after a little these orders were practically carried into effect. The latrines were covered daily with fresh earth. A daily written report was made to me of the sanitary condition of the camps. Diarrhea and dysentery which had been causing much sickness and many deaths, were mainly eliminated. The whisky ration was cut off and we believed we had the

healthiest command in the army. Of course there was at that time no knowledge of bacterial infection, but it will be noted that the men were furnished with a sterilized diet. The import of this result was recognized by my superiors. To it I owed my rapid advancement to the position of Medical Director. I have always felt that the fruitage of this service was largely owing to my mother, who taught me how to cook.

There was a brigade of colored troops upon the island. From one of these regiments a detachment of about 200 men had been left in Norfolk where smallpox was prevalent. Dr. Henry A. Martin of Boston, who should ever be held in remembrance by the profession of America as the introducer of animal vaccine, had been sent to Norfolk to supervise the vaccination of the troops and of the heterogeneous population. These 200 men were sent in a sailing vessel to Folly Island without a medical officer. One man died and was buried at sea—disease, of course, unknown. Upon their arrival the men were distributed throughout the regiment. About ten days after the death above mentioned my attention was called to one of the number who was very acutely ill. I was ignorant of the cause, but one of my assistant surgeons had seen something of smallpox and feared this was the disease. The next morning it was all too evident, for thirteen others were in a like condition. Examination of the arms of some of the men showed crusts almost ready to be detached—men vaccinated by Dr. Martin. The Norfolk contingent were immediately placed in an isolated camp surrounded by a guard with loaded rifles, ordered to prevent all communication. The crusts I personally made with glycerine into a pasty mass and with my own hand vaccinated 800 men before I slept. The procession of dusky arms all that long night comes up in memory like a nightmare-dream. Eighty cases of smallpox occurred in the isolated camp with forty deaths. Not a single case of smallpox other than those of this detachment

developed on the island—an emphatic proof of the value of vaccination.

Upon the occupation of Charleston by our troops, near the end of the war, a new problem confronted me. Under the conditions of the siege, it is hardly possible to conceive a more lamentable picture than this devoted town presented. The population was estimated at 40,000 and our force of occupation numbered about 15,000 soldiers. Smallpox broke out among the refugees returning to the city, rendering a rigid enforcement of vaccination necessary. We detailed a force of 500 men, impressed into the service such transportation as we could procure, and, under a personal inspection of the medical staff, a house-to-house cleaning was carried on with scrupulous care, inspection of the water supply and sewage being rigidly conducted. We left the city of Charleston more thoroughly sanitary, perhaps, than it has been at any time, before or since. My resignation and return to civil life followed this final military service.

The leading surgeons of the armies, both North and South, were men of distinction and merit. To most of them the operative measures of treatment were familiar. The experience of subsequent years has added comparatively little to the technique of operative procedure. Of course, wound infections were almost universal. It was soon learned that the greater number of the wounded aggregated in permanent buildings, notwithstanding the better supervision and discipline possible under such conditions, added materially to the mortality rate, and that the wounded isolated in tents made more rapid and easy recovery. The drainage of wounds, emphasized by the French, was a common practice and, as far as might be, cleanliness of wound was the rule.

Our profession is remarkably fortunate in having the monumental work entitled *The Medical and Surgical History of the War of the Rebellion,* prepared under the direction of Surgeon-General Joseph K. Barnes, U. S. A. In the intro-

duction he states that no work of this character, or of equal magnitude, has ever been undertaken. The only national publication of military medicine and surgery then issued was by the French government, in 1865, upon the Crimean campaigns. Dr. Barnes explains:

"In carrying out the intentions of Congress it has been my earnest endeavor to make this Medical and Surgical History of the War not only a contribution to science, but an enduring monument to the self-sacrificing zeal and professional ability of the volunteer and medical staff, and to the unparalleled liberality of our Government, which provides so amply for its sick and wounded soldiers.

The Confederate medical records in the possession of this office appear, as a general rule, to have been kept with commendable exactness and it is remarkable that physicians suddenly called from civil practice should have so speedily mastered the intricacies of military routine. The forms used and the medical organization were very similar to those of the Union Army."

Dr. Samuel P. Moore, Surgeon-General of the Confederate armies, was a man of great ability. He conducted his department with rare skill and success when the constant lack of material is considered. The long list of medical officers killed in action, dying from wounds and disease, attests the ever-present danger pertaining to the duties of the service.

Ours was the first great war in which anesthetics were in general use. Dr. Otis estimated from available data that anesthetics were used about 80,000 times. For many reasons chloroform was more commonly employed. A few fatal cases are reported. Of nearly 8000 cases, 37 fatalities were attributed to chloroform and 4 followed from the use of ether. My attention has been called somewhat recently to an interesting unpublished manuscript, giving an experience of Dr. Morton, the discoverer of ether, who was assigned to the front in the Virginia campaigns by

General Grant for the purpose of instructing the medical officers in the better way of administering ether. I read this manuscript before the New England Commandery of the Loyal Legion. It should be published.

At the outbreak of the war, the regular army numbered about 13,000 men with 125 medical officers. During the entire period of the war in the Union service about 6000 surgeons and assistant surgeons were appointed, with nearly an equal number of acting assistants. Of the amount of labor performed by this medical staff during the war, some idea may be obtained by the statement that over 6,000,000 of cases of sick and wounded were treated. The cost of maintaining the medical department formed no small portion of the total expenses of the war, and it is a matter of just pride that it can be said that the medical disbursing officers performed their duties faithfully and honestly, and that the immense quantities of medical supplies, distributed all over the country, were almost without exception properly accounted for. The Surgeon-General, in his annual report of 1865, pays the following well-deserved tribute to the fidelity and efficiency of this vast body of professional men:

"I desire to bear testimony to the ability, courage and zeal manifested throughout the war by the officers of the medical department, under all circumstances and upon all occasions. With hardly an exception, they have been actuated by the highest motives of national and professional pride, and the number who have been killed or wounded bears honorable witness to their devotion to duty on the field of battle."

Numerous tent hospitals of the largest size were in successful use during the last two years of the war, it having been satisfactorily shown that the wounded who were treated under canvas did better in every way, were much less subject to gangrene, and recovered sooner than those treated in the large permanent hospitals.

The transportation of the wounded has always been a matter of the highest importance in war. Hand litters were most commonly used in the removal of the wounded from the field. Fifty thousand of these were issued by the United States government during the Civil War. Many other means of transportation were improvised. On one occasion, after an all-day engagement in which I had charge of the field, a brigade of reinforcements were sent up at the close. They were told off in squads of four, two rifles placed muzzle to muzzle, making each side of a litter which was formed by rolling blankets upon them. In this way four men, the butt of the rifle resting upon the shoulder, very comfortably carried a comrade five miles to the rear. The litter used by the Confederates was not unlike that used in the Union Army. There developed in our service the Ambulance Corps which proved very efficient. The subject deserves description at greater length than can be given here. Our system has been used to this date as a model for European armies. Dr. J. Marion Sims was decorated by the French Government for the establishment of the American Ambulance Corps used in the French campaign of 1870.[1]

The Confederate field-ambulance system as described by Dr. Chrisholm, was as far as possible especially equipped by hospital cars. They were not very much unlike sleeping-cars, the berths being comfortable stretchers. These cars

[1] In 1797 Baron Larrey organized an ambulance department, used in the North Italian campaigns, which he called the flying ambulance—named *The Century*—and established a school of anatomical and military surgery in each of the principal towns of Italy. These ambulance trains were in three divisions, each composed of 113 men and commanded by a senior surgeon. The ambulances contained hair mattresses and movable floors, to serve as stretchers. They were hung on four springs and were a great improvement in collecting and conveying the wounded from the battlefield. The ambulance corps, which always moved with the advance guard, was ready to render immediate assistance to the wounded. The speed of these carriages secured prompt transportation of the sufferers.

were about fifty feet in length and accommodated from thirty to fifty patients. In some the stretchers were suspended upon rubber rings. Toward the close of the war, special hospital trains were provided. That of the army of the Potomac consisted of twelve cars, one for the kitchen and dispensary, and ten for the sick and wounded. So far as I know, this was the initiation of the sleeping-car, with equipment for furnishing food-supply. Pullman developed the sleeping-car, now in common use, from this ambulance train. Now for the transportation of the wounded from the Channel ports to interior points the ambulance train on the Great Eastern railroad consists of nine coaches of which five have been turned into ward cars, each containing beds for twenty men. The beds are disposed in two tiers. The change of the English car for this purpose is much more difficult than the transposition of the Pullman sleeper.

The mortality tables show clearly the cause and effect of conditions which are now mainly preventable. A better knowledge of the wounds inflicted as well as their treatment, has greatly lessened the death-rate. Intestinal diseases were the common causes of death, largely owing to errors of diet. The water supply of an army is the most difficult problem of an active campaign where troops are employed in large numbers. Infectious diseases of the alimentary tract, producing typhoid fever, diarrhea, and dysentery, lessen the effective force of a campaign and produce more serious illness and more deaths than all other causes combined.

The statistical tables of the United States Government give a total number of deaths of 304,369, a little less than one-third dying as the result of casualties in battle. Dr. Joseph Jones reports the total number of deaths in the Confederate armies as about 200,000. Three-fourths of this number died from disease. The tabulated statistics of the Union Army show a total in excess of 6,000,000 cases of disease and 400,933 cases of wounds. There were over

75,000 cases of typhoid fever, a little more than one-third resulting fatally. Diarrhea and dysentery were the more common diseases with large mortality. More than one-fourth of all the reported cases of sickness and death were due to intestinal troubles. Malarial fevers constituted one-fourth of all cases of disease, causing, if typho-malarial fevers are included, something more than one-tenth of the total number of deaths. The percentage of malarial diseases among the colored troops was quite in excess of that among the white troops—an evidence that they did not possess that insusceptibility to malarial influence which has generally been claimed for them. A further analysis of these reports has a special interest, but the subject does not permit of greater detail here. It is interesting to note the diseases and deaths reported among the Union troops in Confederate prisons, and equally interesting is a similar tabulated list among the Confederate troops in Union prisons.

This most melancholy picture of war which drained the resources of a continent to the uttermost, directly causing the death of over half a million of the young and vigorous men of a generation, is too sad for further contemplation. The aged veteran is still everywhere to be seen exhibiting the protracted years of suffering resulting from these four years of war.[1]

The particular object of this paper is to compare the experiences of our Civil War period with those of the present Continental contest, said to involve already more than

[1] From time immemorial it has been recognized that deafness may be caused by violent sound waves affecting the ear. Only recently I have seen a veteran of the Civil War who was one of the gunners upon a monitor engaged in the siege of Charleston. Following the firing of one of the 15-inch guns, the drum of both ears was ruptured, since which time he has been totally deaf. I mention it, since in modern warfare, by the use of high explosives in confined spaces, this danger is greatly increased. Artillerymen thus exposed should wear cotton or other substance in the external ear.

10,000,000 soldiers united in a death grapple for the supremacy of Europe. Climate plays an important part with its resulting exposures as a cause of sickness and death. Here we point with pardonable pride to the victories of peace. The medical staff of the United States Army during these later years has scored victories over tropical diseases by means of sanitary measure based upon scientific knowledge of causation, which make an era in the history of medicine. Yellow fever is not only in control but gives promise of being eliminated from the pestilences of the past. A similar scientific knowledge of typhoid fever has reduced it to a minimum, and the prophylactic measures of antitoxin have practically banished it from the United States Army. Intestinal diseases of every type, almost invariably produced by improper ingesta, are under control thanks to the work of a very considerable number of scientists belonging to the United States medical corps. Major-General Gorgas, our present Surgeon-General, is a distinguished leader in this war against disease. Tropical diseases have been mastered with a success which makes this great zone of the earth a white man's country and will enable it to contribute a material share to the world's future welfare.[1]

[1] The following interesting anecdote was told me sometime since by Dr. Gorgas: The incident occurred in Havana, Cuba, where he was engaged in the study of the mosquito as the carrier of yellow fever infection. He was summoned one night in great haste to attend to a reported case of serious fracture of the shoulder-joint. A prompt response to the call found one of his pet mosquitoes with a broken wing. A commission having been appointed from Washington to report upon the value of his laboratory studies, they did not hesitate to tell Colonel Gorgas that they considered his deductions sheer nonsense. Just at this moment an assistant entered and hurriedly reported, in an undertone: "Colonel, the infected mosquitoes in one of your cases have broken loose." Whereupon the learned members of the Commission rushed so frantically away that they actually took the side of the tent with them.

Another illustration of the valuable work done under governmental supervision is the demonstration of the role of the parasite commonly

The victories of peace are no less to be commemorated than the victories of war. To Jenner, to Lister, to Reid, to Gorgas, and to Ashford will be given the grateful appreciation of generations yet unborn.

I have already pointed out that prophylactic measures are the important ones for consideration and control in the

called the hookworm which infects a large percentage of the people of tropical countries. To Major Bailey K. Ashford of the Medical Corps of the United States Army, and his faithful assistants, is accredited this service. The extreme anemia and debility of the poorer classes of Porto Rico aroused his sympathy and led to investigation. Examination of the blood convinced him that the condition was due to parasitic infection. Further investigation showed that the intestines of all these patients contained great numbers of the eggs of the hookworm. In November, 1899, he telegraphed the chief Army Surgeon at San Juan: "This day has proven the cause of many cases of progressive and pernicious anemia on this island to be due to Anchylostomum duodenale."

The long careful studies and the victory won read like a romance worthy of the early days of knighthood. The work was hard and discouraging. It was demonstrated that the hookworm, when fully developed, is from a third to half an inch long. When still infinitesimal it gains admission to the body by penetrating the skin, usually the feet, and continues its upward journey until it finds its way into the small intestine where, clinging to the walls, it generates a poisonous fluid producing marked conditions of disease. The female deposits numberless eggs which are ejected with the feces. Unless subjected to sunlight, these eggs hatch quickly in the soil and reinfection of individuals follow. The sanitary prevention lies in the destruction of the excreta and the wearing of shoes. A simple and effective remedy was found in thymol, the use of which is safe. More than 90 per cent. of the patients were cured. Up to 1908, nearly 200,000 cases had been treated with a mortality of $\frac{1}{6}$ of 1 per cent. Dr. Ashford estimates that when Porto Rico came under our control there were over 500,000 cases of anemia in the island. The improvement of the health of the lower classes is so marked that their effectiveness is doubled. The good work must go on, however, since $\frac{1}{6}$ of the population is still infected. Many of the poor whites of our great South land are similarly affected.

"When we consider the number of people living in countries where yellow fever, hookworm, and typhoid fever are endemic, what fields are not open for the amelioration of physical ills, if funds are available through the granting of a federal charter for the incorporation of the Rockefeller foundation with one hundred million dollars at its disposal?"

supervision of soldiers. The soldier is a carefully selected man in the early prime of his physical vigor, and it is the duty of the medical officer to conserve his forces so as to maintain the highest degree of energy. Hence prophylaxis and sanitation, in a broad sense, are the largest factors of even the active campaign which culminates in devastating battles. No small part of the duty of the medical supervisor is that of teacher; he must instruct his men how to live and why excess of every sort should be avoided.

The unwritten record of the injury which alcoholic drinks played in our Civil War is beyond estimate. From the private in the ranks to the officer in command, all soldiers had been taught to feel the value of so-called *alcoholic stimulants*. Whenever it was possible their use was constant. Many a battlefield was lost owing to the influence of this pernicious drug. We can now understand why in the armies and navies of all the nations of the world, alcoholic drinks are either prohibited or used in very limited quantities. The soldier of the United States Army costs the Government about $1000 a year, and from the economic standpoint the maximum service is demanded. The science of today gives clear demonstration that almost in proportion to the amount of alcohol taken efficiency is lessened. The soldier cannot march as far, shoot as straight, nor is his power to resist disease as sure a protection with alcohol as without it. We are now witnessing the greatest tragedy the world has ever seen. History records no calamity so overwhelming. It is interesting to note that Russia has abolished the sale of alcoholic drink in her entire domains since its outbreak. Doubtless the excesses and outrages by the German soldiery are in part attributable to the influence of alcohol, to the great temptation from the capture of immense storehouses stocked with the vintages of Belgium and Northern France. A poster has been widely distributed signed by many of England's foremost medical authorities, as follows:

EFFECTS OF ALCOHOL

ON

Naval and Military Work

TO ALL MEN SERVING THE EMPIRE

It has been proved by the most careful

SCIENTIFIC EXPERIMENTS

and completely confirmed by actual experience in

ATHLETICS AND WAR

as attested by

FIELD-MARSHAL LORD ROBERTS
V.C., K.G., K.P.

FIELD-MARSHAL LORD WOLSELEY
K.P., G.C.B.

and many other Army Leaders, that

ALCOHOL OR DRINK

(1) Slows the power to see Signals
(2) Confuses proper judgment
(3) Spoils accurate shooting
(4) Hastens fatigue
(5) Lessens resistance to diseases and exposure
(6) Increases shock from wounds

Gunshot wounds of today differ very materially from those of half a century ago. The large soft lead bullet used lacerated the tissues greatly and usually comminuted the bones beyond the possibility of repair. Portions of clothing were commonly carried into the wound and such wounds were almost necessarily infected. Today the small bullet

with a sharp steel point, at an initial muzzle velocity of over 2700 feet per second, cuts its way through the tissues with surprising little damage to most of the structures. The larger bones at the shorter ranges present a clean-cut entrance and exit without fracture. Such wounds may be uninfected, and the first dressing carried by every soldier properly applied at once, makes it probable that the wound may heal by primary union. Such protective care pertains in a large degree to wounds produced by other projectiles. Fifty years ago the role of microörganisms in their death-dealing potency was unsuspected, in wounds as well as in disease. The immortal Lord Lister, after years of strenuous insistence, convinced the medical profession that suppuration in wounds was caused by the introduction of certain organisms of low order and very minute microscopic size. Out of this fundamental teaching has been slowly evolved modern aseptic surgery.

One of the indirect profits derived from the Civil War was the broadening of the view and deepening of the desire of many of our more ambitious young surgeons to increase their knowledge by foreign study. From this more than anything else has arisen the acknowledged supremacy of American surgery, chiefly owing to the bitter rivalry between the English, French, and German schools, who would acknowledge little value to be derived outside of their own countries. I accepted the position of assistant in Harvard Medical School upon my return from the army in order that I might profit by the advantages given to a post-graduate student. I had a long period of pupilage in the University of Berlin, Germany, and in 1870, spent the summer in Edinburgh as Mr. Lister's first American pupil. His teaching at this period was considered so heterodox that the University professors gave him scant courtesy. I became convinced of the supreme fundamental importance of the role of bacteria in wound infections and resolved to devote my life to new and better means of wound treatment. For

a time after my return I held in consideration the teaching of surgery in Japan. Had I done this I should have felt myself, doubtless, in a large degree, the originator of the new methods of military surgery which had their revolutionary fruitage in the great campaign of the Russo-Japanese War. The Japanese surgeons taught the world the most remarkable lessons of aseptic methods in the treatment of wounds. On a yet larger scale the great armies of Europe are today making practical demonstration of the unsurpassed value of such methods. The progress which has been made during the later years in military weapons of every description is almost beyond belief and the world is aghast over the frightful carnage of the present battlefield. The medical profession, by every measure within its power, has attempted to keep pace in furnishing relief. The hypodermic injection of morphine, strychnine, and other drugs is given as soon as possible to the wounded man yet on the field. His antiseptic pad and bandage are at once applied and as quickly as may be, he is removed to the well-equipped hospital. In this lies the chief contrast between the efficient surgery of fifty years ago and the yet more efficient surgery of today. However, wound infection with its concomitant factors of systemic poisoning, gangrene, tetanous and death must still be all too important results of the battlefields of the present and of the future.

Undoubtedly the medical department of an army should be given more power—in certain matters supreme power. Sanitary measures should be entirely under their control. In many ways the duties of the medical corps are more important before than after the battle. Then they are, like the wreckers on the seashore, gathering in as far as possible the salvage from battle. In the campaign their first duty is to keep the army in such perfect condition as to be able to respond with the maximum of efficiency and valor. To the soldier, the camp and the campaign should be a school of sanitary training.

WHAT THE CIVIL SURGEON CAN DO FOR MILITARY SURGERY IN TIMES OF PEACE

By Joseph Colt Bloodgood, M.D.
Baltimore, Maryland

There is as much reason for an educational campaign on first aid in accidental wounds as on tuberculosis and cancer.

The results of the propaganda to educate the public on tuberculosis are now available and demonstrate their great value. In a smaller way we are seeing the results of education on cancer control, but it will be some time before the exact figures are obtainable.

Undoubtedly the present European war has focussed the attention of the public on first aid in accidental wounds, and apparently this is the psychological moment to start this campaign.

The preliminary discussion under the title of this address will afford ample opportunity to outline the various problems.

The larger and more engrossing problems of the daily work of the civil surgeon are surgical diseases and operative wounds. Accidental wounds are given less attention for many reasons. The number of such cases in the different clinics is small and when the injured patient reaches the hospital the problems of treatment under this ideal environment are apparently less difficult and in the opinion of many surgeons to a certain extent solved.

All civil surgeons know that the sooner an accidental wound is properly dressed and a fracture or joint injury properly immobilized the better the result. They also know that the chances of a patient with a perforating abdominal wound are pretty good if he can be transported to

a hospital and operated on within the first twelve hours. In head injuries, also, more recent experience demonstrates the excellent results of early decompression.

However, in recent years, with few exceptions, the majority of civil surgeons have done nothing toward the education of the public on first-aid measures and the importance of proper transportation to the nearest available hospital. With few exceptions the railroads of this country have not established uniform and efficient first aid methods for accidents.[1]

This is also true, with few exceptions, in all companies employing large numbers of laborers in which accidents are by no means infrequent.

The fire and police departments are not receiving the instructions they should in first-aid dressing and transportation.

There are, of course, brilliant exceptions throughout the country in different localities, but as a nation we have sadly neglected the problem of accidental wounds, just as for years we had neglected tuberculosis and cancer.

I was stimulated to investigate the problems of military surgery, because I happened to be in London in August, and was asked to make a public address on military surgery and transportation. Never before had I given so much attention to the literature on war surgery, and as I could concentrate on it for a number of days, I was able not only to get the details, but a broad conception of the surgical problems in the environments of war from the large literature of the more recent wars.

From this I became impressed that the civil surgeon could do much in time of peace for preparation for the emergencies of war.

[1] In the discussion of this paper, Dr. R. W. Knox of Houston, Texas, chief surgeon of the Sunset Route, gave the information that such measures had been put in execution on this railroad system in Texas, and with the most gratifying results.

In time of war the majority of gunshot wounds are inflicted on the firing line. Here it is impossible to have much material for the dressing of wounds and the fixation of fractured bones and injured joints. It is also impossible that these wounds be dressed by surgeons or even the hospital corps men.

This brings up the first problem of war surgery which is not so very different from the problem of accidental wounds in time of peace.

The soldier must carry his own first dressing, and every soldier must be instructed in the simple measures of covering a wound with a piece of sterile gauze. He must also be instructed in the great importance of non-interference, that is, not touching the wound with anything but the first-aid bandage.

The first-aid bandage is somewhat uniform throughout the armies of civilized nations, and all men of the regular army receive instructions as to the application of this bandage. This is not the place to discuss the various types of first-aid dressings. They are all alike in principle—a piece of sterile gauze which covers the wound and is fixed with an attached bandage or adhesive straps.

The point that I wish to make is that the result after an injury in time of war depends more upon the first dressing than on any other factor over which we have control. For this reason, in military practice it has been found essential to give every soldier his own dressing and to give every soldier sufficient instructions so he will be able to apply to his wounded comrade the first dressing.

The soldiers also receive instructions in simple methods of immobilizing the extremity for larger wounds, fractures and injuries to the joints. When possible these larger wounds requiring immobilization should be dressed by a surgeon or a member of the hospital corps who, of course, will be more efficient than the soldier.

On the firing line everyone from surgeon to soldier must

get along with the least amount of material and the simplest measures for immobilization.

Now, in civil practice, the hospital surgeon as a rule rarely thinks of economy in material and simplicity of methods. If he had this in mind he might develop methods which would give just as good results in time of peace and would, in addition, be available for wounds in time of war, or for accidental wounds far from hospitals and large dressing supplies.

Here, therefore, we have a problem for the civil surgeon. If the results are equally good not only will time be saved but there will be a saving in material and thus economy in the hospital management.

From this we also learn another important fact: In civil life, whether it be a single accident or the injury of a large number of people in a railroad catastrophy, or a devastating fire, or a sudden flood, or an unexpected hurricane, or a panic in a crowded building—it will always be impossible, except in a few instances, to get expert surgical help quickly after the infliction of the wound. The ignorance of the ordinary individual and the lack of available first-aid material are present in practically all accidental wounds in civil life. There is always an interval with its dangers of secondary infection and frequently faulty transportation. Expert aid usually comes at a period when it cannot accomplish the same results that it could have accomplished earlier after the injury.

To give the injured civilian the same chance as the wounded soldier, the public must be generally educated on first-aid principles, and first-aid packages must be widely distributed throughout the country.

It would be inexpensive and not difficult to furnish every employee of a railroad, or trolley lines, police officers, firemen, postmen with first-aid packages; employees of all large manufacturing plants could be similarly supplied. Uniform simple first-aid packages could be kept in all drug stores

and restaurants; they could be carried in a box in all passenger cars and electric cars; every chauffeur who takes out a license for an automobile could be compelled to carry in his machine a small first-aid package. As stated in a previous foot-note, such a scheme has been established in the Sunset Route in Texas.

Beginning with the schools instruction in first-aid could be given boys and girls after a certain age. It could be continued in the Boys Scout organization and in the higher schools and universities. All laborers could be instructed. Without much difficulty this education could be made almost universal. There is no reason why every parent and every teacher should not know how to dress a simple wound and should not have available the simple material for such dressings. There is no reason why every adult, male or female, should not be prepared by proper education to properly dress a wound on themselves or some other individual.

A national movement of this kind which would educate large numbers on first-aid measures would not only be life- and time-saving in time of peace, but the male population would be better prepared if they were called suddenly to the firing line in time of war.

This movement would not only be humane, but economic. The loss of life in accidental wounds and even among the injured in time of war is not so great, but it is the loss of time and the disability that is costly.

Kitchener put the whole question in a single sentence when he said to the recruiting officers in England: "Teach the men how to take care of themselves on the firing line and how to shoot." In civil life it is just as important to be instructed how to take care of yourself.

At the present time there is not sufficient uniformity in first-aid methods and in first-aid material. The numerous books in all languages on first-aid to the injured need revision.

The civil surgeon in time of peace has a great opportunity

to investigate the different methods, in the accident wards and dispensary, in the operating-room, and in the experimental laboratory.

We have by no means demonstrated the best methods, nor the simplest and most economical, nor the methods available for the different emergencies and environments. Except in time of war, the military surgeon has little opportunity to treat wounds, but accidental and operative wounds are ever present in the practice of the civil surgeon.

That the tincture of iodin has practically eliminated all of the older methods of cleansing the field of operation is a demonstration of what can be done. Here it is almost forty years since Lister introduced his simple technique with pure carbolic acid, and now we return to a simple method again—tincture of iodin. Surgeons did not turn to tincture of iodin because the results are better, but because the results were equally good, and the method time-saving, more comfortable for the patient, and very economic in material. There is no doubt that we waste tincture of iodin in preparing the wound. Perhaps we use ninety per cent. more than necessary. Here is an opportunity to investigate whether a spray will not be equally efficient. There is no doubt that it would be more economic.

The preparation of the skin with tincture of iodin is so simple and the material can be carried in such small quantities, that it is available for the treatment of wounds on the firing line. Now, the question arises whether it should be put in the first-aid package and the soldiers be instructed how to use it.

In civil life we must ask ourselves the question whether the public shall be instructed on the employment of tincture of iodin in the first-aid treatment of wounds. Is there any danger in such instruction? The employment of carbolic acid has perhaps done more harm than good in the recent treatment of wounds—carbolic burns, carbolic gangrene, and deaths from drinking carbolic acid accidentally have resulted.

The question of handing over the technique of tincture of iodin to the public should be carefully considered. Surely they should be taught most emphatically to have nothing to do with carbolic acid, either pure or in solution. The same is true of tablets of bichloride of mercury. The good of these two drugs in domestic medicine is far less than the harm. Here we, therefore, see the dangers to the public when, because of education or otherwise, they attempt to treat themselves.

In instructing the soldier and the layman how to cover a recent wound with a piece of clean or sterile gauze and fix it with a bandage or adhesive strap has no element of danger, but when we come to the employment of disinfectants the dangerous possibilities must be considered.

In the majority of the armies of the world the gauze of the first-aid package is impregnated with bichloride of mercury, and now many military surgeons are advising and practising the painting of the wound and its environment with tincture of iodin before putting on the dry bichloride compress. If this compress becomes wet the bichloride will be very irritating to the iodized skin, and it is my opinion that if iodin is to be employed the gauze pads should be of sterile material and not impregnated with any antiseptic.

The civil surgeon should re-investigate the first dressing of an accidental wound—Are antiseptics necessary? If so, which is the best? At the present time it seems to be the consensus of opinion that if an antiseptic is employed, alcohol or tincture of iodin give the best results. But many surgeons are of the opinion that the first dressing of any wound by the ordinary layman whether in civil life or on the firing line should be an occlusive dressing of aseptic dry gauze. Any other treatment should only be applied by an experienced hand, and even the experienced hand may do harm by unnecessary interference.

The civil surgeon in time of peace can be helpful to the military surgeon in the establishment of a uniform method

of first-aid dressing and measures and in the writing of a single, uniform, first-aid manual.

In this country this is the psychological moment for the propaganda and for the establishment of such uniformity on a national scope.

I sincerely trust that the Medical Departments of the Army and Navy will realize that now is the time to act. There seems no doubt that it is the function of the National Government to attempt to establish such uniformity.

It seems that it could best be done by a commission of medical officers of the army and navy. They could be selected by the Surgeons General and detailed by the authority of the Secretary of War and Navy to give their entire time to this question.

This commission of army and navy surgeons could easily obtain the assistance from civil surgeons throughout the country. There is a number of surgeons who have given large attention to the problems of accidental wounds. Railroad surgeons, surgeons to large manufacturing establishments would gladly help with their accumulated experience.

Having established a uniform single manual of first-aid and a uniform first-aid package and first-aid measures, there would be not much difficulty in having this adopted throughout the country. Some changes might have to be made to meet special emergencies under unusual environment. Having established this uniformity and having adopted it throughout the country, then the commission would begin to receive reports in regard to results. Civil surgeons would be more apt to take up the investigation in the dispensaries, wards and operating rooms. Special problems might arise which could be investigated in the experimental laboratory, and this more or less wide-spread interest and investigation would undoubtedly develop more efficient measures.

There is no doubt, however, that now we have sufficient knowledge and experience for the establishment of a uniform

first-aid package and for the writing of a single uniform first-aid manual, and there is no doubt that if these are adopted and employed universally throughout this country, there will be at once noted a great improvement in the results of accidental wounds, and there is no doubt that this country, at least as far as its medical and surgical department is concerned, will be better prepared for war.

MILITARY SURGERY, WITH SPECIAL CONSIDERATION OF GUNSHOT INJURIES

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While the surgical principles of the treatment of wounds inflicted by military weapons do not differ essentially from the treatment of those of the traumatisms of peace, the application of these principles under the peculiar conditions which exist in war, constitutes the difference between military surgery and civil surgery.

The facilities and refinements of the civil hospital cannot be provided in campaign, and the sudden influx into the aid stations, dressing stations, and field hospitals of wounded in large numbers necessarily imposes differences in the treatment of this class of injuries from that which can be carried out in a civil hospital. Operations which could be here performed without danger, would, under the conditions prevailing in the field, be inadmissible. In many cases, beyond the arrest of hemorrhage and the application of first-aid dressing and temporary splints, hours may elapse and transportation to the rear be required before definitive treatment can be instituted. In other instances prompt action is necessary and surgical aid must be rendered at once.

Ever since the introduction of firearms as weapons of warfare, wounds inflicted by projectiles have formed by far the majority of the injuries of battle. Wounds produced by cutting, thrusting, and puncturing weapons, such as swords, sabers, bayonets, and lances, are comparatively

infrequent, so that military surgery concerns itself principally with the consideration of gunshot wounds.

Generally speaking, in the wars of fifty years ago and up to and including the Spanish-American war, wounds by small-arms bullets have constituted more than 90 per cent. of all battle wounds; with the relative increase in field artillery in modern armies, the ratio of artillery wounds to wounds from small arms has increased considerably, and in recent wars (Russo-Japanese and Balkan wars) artillery wounds have constituted from 15 to 20 per cent. of the total.

The character of operations influences the type of battle wounds. Thus, in sieges and attacks on fortified places, artillery wounds will furnish a larger proportion of casualties than a general engagement, while in assaults on entrenched positions and in cavalry charges, the ratio of bayonet and saber wounds will differ from those received in general engagements.

A new missile has recently been introduced in warfare, the dart, which is launched from air craft. These darts are described as shafts of pressed steel, 10 cm. long and 8 mm. thick, bulky in the lower third, and ending in a sharp point. The upper two-thirds consist of four skeleton wings. When such a missile perforates it produces a stellate wound. They weigh 16 gms. each, and possess sufficient velocity when dropped from a height to perforate the skull. In consequence of the rapid movement of the air ship they may be made to cover a considerable area. It is doubtful whether the introduction of this unique type of missle will prove to be a factor of any importance in modern warfare.

Gunshot wounds may be defined as wounds resulting from the effects of any explosive force: "Any missile that is set in motion with sufficient velocity by a sudden expansive force may cause a gunshot wound," hence gunshot wounds will include besides those inflicted by small arms and artillery, those produced by grenades, bombs, or other explosive forces.

The modern military rifle possesses certain characteristics common to all the various models. The bullet is of small caliber, varying from .255 to .315 inch (6.5 mm. to 8 mm.), with a weight of from 150 to 220 gr.; its head is either ogival or pointed in shape, and it has an initial velocity of from 2000 to 2700 feet per second, and a flat trajectory. The pointed type has been adopted by England, Germany, Turkey and the United States. Machine guns use the rifle ammunition, and wounds inflicted by them are of the same character as those inflicted by the rifle.

Modern artillery is always rifled, and the projectiles employed are cylindro-conoidal in shape; they consist of shells, shrapnel, canister, and solid shot. Solid shot is no longer used in modern warfare. A shell consists of a hollow case of forged steel or cast iron, containing a bursting charge which is ignited by a time or percussion fuse, and depends for its action upon the fragments into which it breaks on bursting. Shrapnel consists of a shell containing a varying number of bullets of hardened lead, held together by some such substance as rosin, and a bursting charge which is exploded in the same manner as the common shell. The modern shrapnel is designed to carry a number of bullets to a distance from the gun and to discharge them with increased energy over an extended area. It is the principal field artillery projectile, and causes the greater number of wounds from this arm. The shrapnel for the three-inch field gun of our service contains 252 balls of hardened lead, of 0.49 caliber. It has an initial velocity of 1700 foot seconds, and on bursting an additional velocity of 300 foot seconds is conferred on the balls, making a remaining velocity of 865 foot seconds at 6500 yards. From the point of bursting of the shrapnel the bullets form a cone of dispersion covering a considerable area, dependent upon the distance of the point of bursting from the gun. In our service 80 per cent. of the ammunition of the field batteries consists of shrapnel, and 20 per cent. of shells.

Hand grenades, of which there are several different types, have come into considerable prominence as implements of destruction in recent wars; they are used only at close quarters, as in assaults on intrenched or protected positions. They usually consist of a cylinder filled with an explosive and provided with both time and percussion fuses; grenades upon exploding break into many fragments. A rifle grenade is also used in some armies, in which the grenade is fired from the rifle by a small charge of powder. Wounds from grenades are inflicted by pieces of the casing, by the explosive action of the charge contained in the grenade, or by both. They are usually multiple, and may range in severity from a superficial burn to the shattering of a limb or other parts of the body. Fragments of casing are more apt to cause deeper wounds than fragments of shell. The injuries resulting from the explosion of torpedoes, mines, and bombs are extremely terrible; in addition to the destruction wrought by stones, splinters, and fragments of casing, there may be extensive burns from the flames of the gases.

Wounds produced by perforating fragments of shells differ from bullet wounds in that they are less clean-cut, are irregular and more or less ragged. The exit wound, if it be a perforating one, is usually much larger in size than the entrance wound, and may present torn tissues through the opening. The track of the wound is large, irregular, and contused, and is not as direct as that made by a rifle bullet. Shrapnel bullets, being spherical, rapidly lose their velocity, hence their destructive power is not as great as that of the rifle bullet, and they are much more liable to lodge. Shell wounds and shrapnel wounds almost invariably suppurate.

The character of the wound inflicted by a projectile depends upon its size, shape, composition, the velocity at the time of impact, and the type of the tissue injured. The greater the velocity of the bullet the greater is its energy, and the amount of energy expended in overcoming the resistance of the tissues determines the amount of damage done them.

The elongated, jacketed bullet of the present-day military rifle in passing through soft parts, in which but little resistance is met, cuts its way sharply, losing but little of its velocity, and consequently expending but little of its energy. In passing through the spongy bones, as those of the face, the carpus and tarsus, and the epiphyses of the long bones, it usually perforates with but little splintering, while upon the diaphyses of the long bones, the encapsulated organs, like the brain, liver, and spleen, and organs containing fluid or semi-fluid contents, like the bladder, stomach, and intestines, its action is quite different, especially at the short ranges where its velocity is high.

Thus, at a range of 500 yards and under, it shatters and splinters the diaphyses of the long bones, and upon organs containing fluid or semi-fluid contents it will produce explosive effects. Wounds exhibiting explosive effects have the appearance of having been caused by an explosion from within, hence the application of the term. In organs containing fluid or semi-fluid contents these effects are due to the transmission of the energy of the bullet in every direction to the walls of the cavity, in accordance with the law of hydraulic pressure.

When the bullet impinges perpendicularly it punctures the skin, making a small circular opening equal in size to its diameter; when it strikes obliquely, the entrance wound is oval in shape and somewhat larger than the diameter of the bullet. It is surrounded by a ring of discoloration and contusion, and outside of this by a ring of ecchymosis; in skin overlying the loose tissue, like in the scrotum, the entrance wound is apt to be slit-like, and when overlying bone it may be larger in diameter than the bullet; so too, if the bullet has ricochetted, or strikes on its side, or with its butt end, the entrance wound is irregular and lacerated.

The wound of exit in bullet wounds at short range affecting the soft parts only is usually but little larger than the wound of entrance, and there is the same loss of skin, the edges

being slightly averted with rings of discoloration and ecchymosis surrounding it.

At the longer ranges the wound of exit may be only a slit or be made up of triangular flaps of skin. Such wounds, if properly protected immediately after their reception, usually heal by first intention. At the short ranges, especially when bone has been injured, the exit wound usually presents an entirely different picture. It is of much larger size, irregular in outline, due to fragments of bone, muscular and tendinous tissues, carried forward and acting as secondary missiles, bursting the skin outward. Bone dust and fragments of bone may be found adhering to or lying loose in the torn and lacerated tissues. Such wounds are usually accompanied by loss of bone substance between the fractured ends.

Experience in recent wars has shown that the undeformed modern jacketed rifle bullet, when moving with high velocity and encountering great resistance, as in passing through bone, will produce this so-called explosive effect. High velocity implies short range, and consequently explosive effects are, as a rule, only seen at the short ranges, ranges below those at which battles are usually fought. Wounds partaking of this character may also be caused by explosive or deformable bullets (dum-dum), or richochetted bullets; and at long ranges by bullets whose rotary motion has diminished to such an extent as to cause them to wobble, or which are turning end to end and strike the tissues in their length instead of in their diameter, but with still sufficient remaining velocity to perforate; especially is this the case with the "S" or pointed bullet. In this type of bullet the centre of gravity is placed so far behind the centre of figure that it "sets up" (*i. e.*, turns head over heels) upon meeting with the resistance. No doubt many of the accusations made in recent wars that explosive bullets have been employed are due to this action of the pointed bullet.

The modern rifle bullet in passing through soft tissues

destroys that which lies in its track and contuses and lacerates that surrounding it. Owing to its high velocity it is seldom deflected and rarely lodges, and because of its hard metal jacket it rarely fragments. The old type of military rifle fired a soft lead bullet of large caliber, with a comparatively low velocity, which was easily deformed or fragmented, and more liable to lodge, and its traumatisms were accompanied by a greater degree of contusion; consequently infection and secondary hemorrhage were more prone to follow. On the other hand, primary hemorrhage is more common with the modern bullet. It is estimated that 85 per cent. of the deaths on the battle field are due to primary hemorrhage. Because of its small size and high velocity, the modern rifle bullet is less apt to carry into the wound particles of clothing and equipment, as was the case with the older type of bullet, and for the same reason multiple wounds are now more common than formerly. In the case of multiple wounds caused by a single bullet, the second wound of entrance is usually larger than the first and is more liable to infection, by reason of having passed through the skin or clothing more than once, and because of its reduced velocity it is more liable to carry with it pieces of clothing. With obliquity of impact, oval wounds of entrance or exit will result, or the superficial tissues may be carried away; the latter wounds are spoken of as "gutter" wounds. "Gutter" wounds are also met with in bones. In such cases the bones may be only superficially grooved and yet be accompanied by serious damage by reason of fissuring and splintering. Ricochetted bullets are apt to be deformed or have the jacket torn or split, permitting fragmentation of the core, and will cause considerable destruction if they retain sufficient velocity.

The modern military rifle bullet with its pointed head, small diameter, and high velocity, cuts or perforates blood-vessels cleanly, or nicks out a portion of the wall, conditions which do not favor natural hemostasis, and fatal primary

hemorrhage is liable to ensue; laceration of the walls of the bloodvessels may also be caused by fragments of bone acting as secondary missiles, though the hemorrhage in such cases is not likely to be as profuse as that from a clean-cut wound made by a rapidly moving bullet.

Wounds caused by shells and their fragments, being nearly always contusions and lacerations, are not so liable to be followed by profuse hemorrhage. In wounds inflicted by shrapnel, profuse hemorrhage is comparatively rare. In the vast majority of gunshot wounds the hemorrhage is usually slight and ceases spontaneously. Arterial walls are sometimes contused by the bullet grazing them; if primary union takes place in the wound no hemorrhage can follow, but if the wound becomes infected and suppuration ensues, secondary hemorrhage is liable to occur. Traumatic aneurysms as sequelæ of injuries to the bloodvessels are more common now than in former wars, due to the character of the injury inflicted by the modern rifle bullet.

It has been estimated that 22 per cent. of all gunshot wounds received in recent wars are complicated by fracture of the long bones, most of which are accompanied by more or less comminution. As already mentioned, the extent of the traumatism inflicted varies with the character of the bone, whether compact or spongy, and the range and velocity of the projectile. In the shafts of the long bones, at the short and medium ranges, comminution is greater than at the longer ranges, and is accompanied by loss of bone substance; at the longer ranges, fragments are larger and displacement is not so great. In some instances, when the bullet travels at a comparatively low rate, it may plow its way through the bone without splintering it. In the lower extremity lateral impact of the bullet against one of the long bones, aided by the leverage of the body weight and action of the muscles, may result in a spiral fracture; this, of course, can only occur when the soldier is standing.

Perforations through the shaft of the long bones occur

but rarely with the modern rifle bullet and only when the projectile is moving at reduced speed; they are usually accompanied by more or less splintering without much displacement. The tendency of the fissures in bone injuries inflicted by the modern bullet is to stop short of epiphysis. The rapidity with which the bullet moves in its passage through the bone, its small size, and the change in character of the bone at the junction of the shaft and cancellous portion, probably account for this fact.

Gunshot fractures of the short and flat bones and of the articulate ends of the long bones differ considerably from those occurring in the shafts of the long bones. This difference is dependent upon their difference in density. These injuries usually consist of perforation, grooving or guttering; perforation is the most common form. These perforations are usually clean-cut, or they may be accompanied by the separation of scales of bone, usually at the exit side. Fissures rarely extend from the perforations in the articular ends of the long bones into the joint cavity, except at short range or when the bullet "sets up," though synovial effusions may take place into them. Even when no lesion of the bone exists, gunshot wounds in the neighborhood of joints are followed by more or less effusion into the joint cavity, setting up a vibratory synovitis; the energy of the bullet in such cases being transmitted to the synovial membrane. It is evident from what has been said regarding traumatisms of bones, that the femur, tibia, and humerus, being the most resistant bones of the body, usually sustain the greatest amount of comminution and destruction, and consequently furnish the most serious bone injuries we have to deal with, except those of the skull and spine.

Excepting gunshot wounds of the spine, those of the abdomen are followed by a higher mortality rate than any other class of battle injuries.

The mere fact of penetration of the abdominal cavity by a small-bore rifle bullet does not necessarily imply that

a viscus has been perforated, even though the direction of the bullet indicates that it has passed into the intestinal area. The small intestine is very movable, and the bullet may pass in a direction parallel to its axis or between its coils; besides it is elastic, light, and non-resistant, and is easily displaced. Again, perforation may take place without being followed by extravasation of intestinal contents; in such cases the mucous membrane is everted, plugging up the opening; the escape of intestinal contents is further prevented by arrested peristalsis and the formation of peritoneal adhesions. This process requires but a short time, especially if the patient is not moved and the intestines are empty. Cases have been reported from recent wars in which the abdomen was traversed by the small bore bullet and in which perforation had undoubtedly occurred, yet in which no grave symptoms followed. It has been said that the viscera are injured in 97 per cent. of all penetrations of the abdomen by the small-bore rifle bullet. Cases in which the larger abdominal vessels have been severed or perforated rarely reach the field hospitals; those in which the smaller vessels are injured and in which the hemorrhage does not cease spontaneously, demand prompt interference.

Penetration and perforation of the abdomen are often complicated by wounds of other parts, especially of the chest, favored by the prone position assumed by the soldier in firing. If fragments of bone are carried into the abdominal cavity, as often occurs in gunshots of the pelvis, extensive laceration of the abdominal contents is almost certain to take place. Explosive action is liable to occur at the shorter ranges if the hollow viscera contain fluid or semi-fluid contents; such injuries are usually rapidly fatal. The angle of impact of the bullet also influences the size and character of the injuries to the contained organs.

Mention has already been made of the tendency of the long bullet of small diameter to "set up" on meeting with slight resistance; the pointed bullet is especially subject

to this action; when it occurs extensive laceration and destruction must result. In gunshots passing transversely from flank to flank, perforations are almost invariably multiple.

Wounds of the large intestine, except those of the transverse colon and of the extra-peritoneal portion of the gut, are said by Stevenson to be less fatal than those of the small intestine. The walls of the large intestine are thick, and its contents solid, conditions which tend to limit or prevent extravasation. Retro-peritoneal perforations are almost invariably followed by cellulitis and systemic infection. The order of frequency of wounds of the abdominal viscera are: small intestine, liver, stomach, large intestine, kidneys, spleen, and pancreas. Uncomplicated gunshots of the solid viscera of the abdomen are infrequent. If explosive action has taken place the hemorrhage is usually fatal; when uncomplicated, such wounds usually consist of a channeling or grooving of the organs and are rarely fatal.

The treatment of penetrating and perforating gunshot wounds of the abdomen is still an unsolved problem, and probably no subject in surgery has brought forth so much discussion and so much divergence of opinion as this.

With the introduction of the small-caliber, jacketed bullet of high velocity, the application of the principles of antiseptic and aseptic surgery, and the great advances in abdominal surgery, it was generally believed that battle wounds of this class would be attended by a reduced mortality, and that operative treatment would be followed by better results than conservative treatment. Such, unfortunately, has not been the case in military practice. Numerous instances have been recorded in recent wars in which perforation of the abdominal viscera by the small-bore bullet has taken place, and in which the patients have recovered without operation. On the other hand, operations in the field have been attended by a very high mor-

tality. No doubt a large proportion of the latter cases were of a character which would have ended fatally without operation, and operation was done as offering the only chance.

There is no question that in a considerable proportion of abdominal penetrations and perforations, laparotomy is indicated, but the conditions in the field for its successful issue are not favorable. Adequate assistance is often not available after a large battle; so many cases where favorable results are certainly assured demand attention, so that it is rarely possible to devote the necessary time and assistants to operations of this character. Again, the time that has elapsed since the reception of the wound is an important factor; hours may elapse before the case can be brought to the field hospital, the only station where operations of this character can be performed with safety. Severe shock is always present, often increased by prolonged exposure. The English in South Africa found that flies, dust, wind, and the absence of adequate amounts of sterile water militated against success.

Another question to be considered in the treatment of these cases is that of their ability to bear transportation. The field hospital is a mobile organization and must be prepared to accompany the troops in their movements, and be ready to receive the wounded from the next engagement; it must therefore evacuate its sick and wounded to the rear, often over rough roads in rude vehicles; patients with abdominal injuries bear transportation badly, and if to the shock already present is added the shock of an abdominal operation, and the discomforts and exhaustion incident to travel to the evacuation or base hospital, it may be readily seen that the chances for recovery with or without operation are slight.

Where intra-abdominal hemorrhage is taking place, and the patient's condition warrants it, laparotomy is imperative. Ordinarily, though, these cases die upon the field or

are in such a state of collapse upon arrival at the field hospital that operation is hopeless.

The primary treatment in the field in perforations and penetrations will consist in the application of the first-aid dressing, rest, and morphin. Transportation for any great distance should be delayed; all food and drink by mouth must be withheld; thirst is relieved with water by rectum; shock combatted; and if laparotomy is not to be performed, morphin administered freely.

In a recent published report of wounded treated in one of the Bulgarian base hospitals during the Balkan War, the reporter in speaking of gunshots of abdomen (9 cases), says: "all were of slight character. We had no opportunity to perform a regular laparotomy; all were treated conservatively; even severe symptoms disappeared with rest and strict dieting. Operative procedures amounted to simply opening abscesses. Fecal fistulæ were observed twice, one of the descending colon, and one following a gunshot wound of the rectum with injury to the sacrum. Both healed after splitting up the fistulæ."

Where there is a protrusion of the gut or omentum from the wound, such as may be inflicted by cutting weapons, shell and shrapnel, and when internal hemorrhage is taking place, operation is demanded if the patient's condition permits, even though conditions otherwise are unfavorable. In connection with this subject, von Seydel very pertinently says: "Place and circumstances and not the wounds alone expand or contract the indications for laparotomy."

The conclusions that will be drawn from the experiences now being gained in the present struggle in Europe will no doubt prove both interesting and instructive.

To discuss the treatment of the complications and sequelæ of military injuries would require a volume, hence I shall only briefly consider their management at the front; by "at the front" is understood, the lines of assistance from the firing line to the field hospital; these consist of regimen-

tal aid stations, dressing stations, and field hospitals. Necessarily the treatment at the regimental aid stations, which are placed as close to the firing line as possible, will in most instances be of the simplest character; in the vast majority of cases consisting of a sterilization of the wound and the surrounding skin, and the application of the first-aid dressing. Iodin is used to secure sterilization of the skin and wound. The first-aid dressing consists of pads of antiseptic gauze, sterilized bandages, and pins. Every officer and soldier carries this as part of his equipment and is instructed how to apply it. No exploration, no probing, no digital examination, no irrigation of the wound are to be countenanced. The wounded parts are fixed by appropriate bandaging or extemporized splints, when necessary; rest to the wounded part is an important factor in the healing of wounds. No operations except such as may be necessary to save life, as the arrest of hemorrhage, should be undertaken any nearer to the front than the field hospital. Hemorrhage in most cases is slight and ceases spontaneously: if not, it can usually be controlled by tampon or tourniquet until safe operative procedure can be undertaken at the field hospital. Manipulation of the injured part is only justifiable in so far as it may be necessary to render the wounded man more comfortable and to permit of his safe transport to the rear. If shock is severe, measures to counteract it must be employed; pain should be relieved.

At the dressing station, to which point the ambulances advance, further treatment is instituted if indicated; dressings are readjusted, cases recorded, and stimulants, when required, administered. From the dressing station the wounded who are unable to walk are conveyed to the field hospital, the last line of assistance, by the ambulances; others make their way back as they best can. The field hospitals are placed well to the rear beyond danger from the enemy's fire. Here shelter and food are provided, and the wounded rested. Wounds are more carefully examined and

dressed more elaborately and thoroughly; splints of a better character than the extemporized splints are applied, surgical operations are performed, and the wounded are prepared for safe transportation to the evacuation or base hospital. These latter institutions are more extensively equipped and prepared for surgical work of any kind.

Though the field hospital is prepared and equipped to perform serious surgical operations, only such operations are performed which cannot be safely postponed. The base hospitals are fully equipped institutions, equal to our best civil hospitals, and are manned by a personnel adequate for the care and treatment of cases of every kind. Here the military conditions existing at the front no longer prevail and the treatment of these traumatisms and their sequelæ will differ in no wise from those met with in civil practice.

DISCUSSION OF THE PAPERS OF DRS. MARCY, BLOODGOOD AND RICHARD

Dr. Thomas S. Cullen, Baltimore.—Dr. Bloodgood's paper reminds me of a splendid project that the American Hospital Association hopes to see consummated. It is very anxious that a department be established in Washington where the plans of all American hospitals shall be assembled. If this be done any board of hospital trustees or any private individual can in a very short time get a comprehensive view of what has been accomplished in this country. These trustees can after consulting the assembled plans visit the one or two hospitals that seem best suited to their wants, instead of traveling all over the country and then possibly missing the very one they wanted. This department should also include all data and statistics relating to hospital management.

If this project be carried through, and I sincerely hope that it may be, it might be well to broaden its scope and include some of the important subjects referred to by Drs. Bloodgood, Marcy and Richard.

I hope that the members of this Association will, when the

time comes, use all their influence looking forward to the establishment of such a national department or bureau.

Dr. John Young Brown, St. Louis, Missouri.—It has been a great pleasure to me to listen to the reading of these three papers. They deal with a most important subject.

In discussing the treatment of gunshot wounds of the abdomen, I wish to call attention to the fact that there must of necessity be a marked difference in the handling of such cases in times of war and in the methods of handling these cases in civil practice. Colonel Richard has given us a splendid paper and I concur with him fully in all that he has said with the single exception of the statement that many cases of undoubted perforating wounds of the abdomen recover without operation. I have had large experience in the handling of such conditions and in civil practice, it is absolutely impossible to diagnose bowel perforations without doing an exploratory operation.

I agree fully with Dr. Bloodgood that much damage is often done by meddlesome interference in the handling of gunshot wounds of the chest. Many of these cases are immediately fatal, and there are many others that will recover if the wound of entrance is touched with iodine and the chest is firmly strapped.

I disagree with him fully in his proposed plan of watchful waiting in the handling of gunshot wounds of the abdomen. It seems to me that there are certain well-defined symptoms invariably accompanying such wounds, which at once suggest the course to be followed.

I called attention last year to the symptoms resulting from the two classical types of intestinal injuries, resulting from penetrating wounds of the abdomen. First, those in which there were multiple perforations of the mesentery and in which immediate alarming symptoms occur by virtue of the profuse hemorrhage. Second, those in which the intestine is perforated in the bloodless portion and which give no immediate alarming symptoms. The indication for operative work in these two types seems to me to be clear.

If Dr. Bloodgood's assistant was accidentally shot in the abdomen and gave alarming symptoms of hemorrhage, I do not believe that he would sit quietly by and hold his pulse and see him bleed to death. Dr. Bloodgood, however, has sounded a note of warning; but I fear that his paper will be misunderstood by many surgeons, and that such teachings coming from so high an authority will lead many to neglect cases of this type in which surgery alone offers relief.

In conclusion, I should like to ask Colonel Richard to tell those of us who see such cases in civil practice, how it is possible for the military surgeon to make a diagnosis of perforation and penetration without exploration. From my experience, I am inclined to believe that it is far more probable that such diagnoses are incorrect. I base this conclusion on the fact that I have on many occasions opened the abdomen where there was a wound of entrance and wound of exit, and after careful search have failed to find any visceral injury. In my judgment, it is this type of case that is incorrectly diagnosed as a penetrating and perforating wound. Such cases would, of course, recover without operative interference.

Dr. C. E. Caldwell, Cincinnati, Ohio.—I am thoroughly convinced that there are no signs by which we can determine ultimately the question of perforation of hollow or solid viscera in the abdomen after a gunshot wound. I have seen a large number of cases, some of them having had as many as seven or eight perforations of the bowel, yet have shown absolutely no symptoms. It has been my rule, where there is a gunshot wound which possibly may have penetrated, to follow the track of the bullet and if I find it has penetrated, I then open in the median line, and thoroughly search for perforations. There are cases where a bullet of low velocity will go through and miss the collapsed intestines and wound some of the solid viscera. The bullet will go through the uterus and bladder in the female and not wound the intestines at all.

I operated on a woman who was shot through the liver. The bullet went directly through the liver; there was considerable hemorrhage following, but suturing the liver stopped the hemorrhage. There was no wound of a hollow viscus.

My idea in regard to the frequency of perforation of hollow viscera, is that it depends upon the state of dilatation of the viscera. Many of these patients come to us who have been drinking beer, eating freely, and the intestines are filled with gas. A bullet of low velocity goes in, there may be rupture of a viscus, with eversion of the mucosa and escape of intestinal contents oftentimes. On the other hand, a bullet of high velocity may go through the abdominal cavity, the intestines may be collapsed and all out of the way, and the bullet may not do much damage. It is hemorrhage that accounts for a large percentage of deaths following high velocity gunshot wounds. These high velocity bullets cause hemorrhage by wounding

arteries. It is comparatively seldom in low velocity missiles that we have actual wounds of mesenteric vessels, but we have with greater frequency wounds of hollow viscera.

Another thing I would like to call attention to is the tendency of wounds of the liver to be followed by pneumonia. The case I recently operated on, and to which I have just referred, was a colored woman who was shot through the liver. She developed a double septic pneumonia from which she fortunately recovered. I think it is Dr. Deaver who calls attention in his book to the frequency of pneumonia following wounds of the liver.

Dr. Bloodgood (closing the discussion on his part).—I do not wish to give the impression that what I said was my opinion about what ought to be done. It was the consensus of view I gathered from a very long and wide reading of the recent literature of the recent war in military surgery.

I was much interested in the two friends who took issue with me in regard to abdominal wounds. I think if they will read Legarde's book and read the literature on abdominal wounds, they would in time of war, not having the environment they have at home, be rather skeptical. Until I read Legarde's book, I felt if I went to the front I should spend my time operating on abdominal wounds, but with the knowledge I have now I would not operate on those wounds. Some recover that have perforation without operation.

The thing I wish to impress most upon you is that it is a good time now for us to be skeptical. In regard to the things we do, we attribute our excellent results to certain things. We ought to remember some of the things of history. Ambroise Paré, the great French surgeon, after a great battle, was enabled to treat all wounded, and he said he could not hardly rest; that he had the feeling as though he must hurry through with this case and with that case, but it was found out that the wounds that were not touched did better than those that were treated by the surgeon. The soldiers were more comfortable and the mortality was lower from non-interference than from interference. Ambroise Paré established non-interference in wounds, and it was forgotten.

There is one thing to remember and it is this: Much of what we do is unnecessary, and some of it may be harmful when we come to face certain problems, such as cholecystectomy and colostomy. When we explain many things we do and attribute a given reason for it, that reason is incorrect.

Lister revolutionized surgery with carbolic acid and attributed the fact to sterilized air. It cleansed the wound, and that he had in his mind for years. The results were due to the fact that the carbolic acid sterilized the wound against the air that entered the wound. We know Lister's results from applying carbolic acid to wounds. He was not treating wounds as his surgical colleagues did. Mr. Lister established the non-interference of wounds, and it seems to me that non-interference with accidental wounds is a thing everybody ought to know. The whole principle of the treatment of an accidental wound is to leave it alone. Do not dress it with anything unless you have sterile gauze. If what has come in contact with it is there, leave it as it is. Unless you can dress it with something that is sterile, leave it alone.

A Baltimore surgeon brought me his paper that he was going to have published on the treatment of wounds for the benefit of the Baltimore policemen, and asked me to correct it. I read it over; it was sixty typewritten pages; I cut it down to one inch long, and said to the author that the best advice to give policemen was to do nothing. He was very much chagrined at this, and said it was not worth while publishing that in a book. Well, I think it is worth while publishing that in a book.

Colonel Richard (closing the discussion).—I have very little further to say on this subject unless it is to emphasize what Dr. Bloodgood has just said. Non-interference on the firing line should be an established rule in the first-aid treatment of these wounds, unless, of course, there is severe hemorrhage which the primary dressing cannot control. The system adopted in our army is simply to apply the first-aid dressing. Every officer and soldier is provided with a first-aid dressing and instructed in its application. He carries that dressing on his person, and if he cannot apply it himself the comrade next to him can apply it for him. If the wounded man cannot be reached by a surgeon or cannot reach the first-aid station, the Hospital Corps attendant on the line simply paints the surrounding skin and wounds of entrance and exit with a solution of iodine, and applies the first-aid dressing. When the wounded man gets back to the dressing station a little more elaborate dressing is applied if there are any indications for it. If there are no indications for it the wound should be left alone until the man reaches the field hospital, and the dressing is not to be changed unless demanded, or perhaps to enable a correct diagnosis to be made.

Fixation, as Dr. Bloodgood says, is an essential feature in the treatment of gunshot wounds. Simple flesh wounds inflicted by the small-caliber bullet rarely suppurate. If any infectious material is carried in it is probably small in amount or so non-virulent that the tissues are able to overcome it.

Dr. Reed.—Will you say something to us about the dum-dum bullet?

Colonel Richard.—Dr. Reed has asked me to explain to you the dum-dum bullet. The dum-dum bullet gets its name from the town of Dum-Dum, India, where it was first manufactured in the fifties of the last century by the British who had established an arsenal there. The dum-dum bullet originally was made of soft lead with a cylindrical hole in the tip, so that it spread when it struck and made a much more ghastly wound than the small-caliber, sharp-pointed, jacketed bullet makes. Dum-dum bullets are sometimes classed as explosive bullets, because they produce so-called explosive effects in the tissues. Explosive bullets are those in which there is a cylindrical hole bored in the tips or ends, filled with an explosive and covered with a percussion cap, which on striking explodes and tears the tissues apart.

There are various ways of deforming bullets: by nicking the hard-metal jacket; by filing across the tip so that the jacket will split; sawing them crosswise, or notching them at right angles. All these deformed bullets have come to be classed as dum-dum bullets. Frequently soldiers will do that through pure maliciousness, but I doubt very much whether any of the European powers authorizes the use of the dum-dum bullet. A number of the nations have signed a convention at The Hague, with a view of prohibiting their use. The only nations that I recall that did not sign were Great Britain and the United States. The reason for that was the British in their colonies had to do with fanatical tribes, and the ordinary small bullet lacked the necessary stopping power that a large-calibered bullet possesses. The reason the United States did not sign that convention was because at that time the War Department was experimenting with a new bullet and a new rifle. It was desired to obtain better results by devising a weapon which gave a flatter trajectory to the bullet so that it would cover a larger range. It would require considerable description on my part to go into the details. That was essentially the reason why the United States did not sign that convention, and I am sure the United

States Government would never permit the dum-dum bullet to be used against civilized people. In the Philippines, in the early days, soldiers sometimes dum-dumed their bullets because in fighting the wild tribes, like the Moros, the small bullet would not stop them. I have known Moros who had been perforated three or four times with the small bullet, still come on with knives and get at the men who were shooting at them, or come within close range of them. For that reason, the soldiers occasionally dum-dumed their bullets.

Dr. Brown.—I would like to ask Colonel Richard on what symptoms he is able to make a diagnosis of undoubted multiple perforations?

Colonel Richard.—Just as Dr. Caldwell, I think it was, said, you cannot make a positive diagnosis at first, for signs of shock are often absent.

Dr. Brown.—If you cannot make the diagnosis, how do you know there are undoubted perforations?

Colonel Richard.—As Dr. Caldwell said, in these cases there is a hernia of the mucous membrane which sets up a localized peritonitis, and walls off the general cavity. Following this localized peritonitis we have the formation of adhesions, abscesses, etc.

In a report of the operations of a Bulgarian hospital, in the Balkan War, through which nine hundred wounded had passed, no laparotomies had been performed; there had been no indications for laparotomy, though a number of cases had been admitted in which there had been undoubted intestinal perforation. In these cases the only operation that was found necessary was the opening of abscesses that resulted from perforations of the intestines. The abscesses were superficial and the diagnosis of perforation was based upon the direction of the bullet track and symptoms, and that when opened fecal odor was present, and fecal fistulæ often followed. Undoubtedly many other cases of intestinal perforation died before they reach the hospital, which was several days' journey from the front.

Dr. Brown.—Is there any method, Colonel Richard, of making a diagnosis?

Colonel Richard.—I do not think that the diagnosis of intestinal perforation can be positively established early in cases of penetration.

UTERINE PROLAPSE, WITH ASSOCIATED PELVIC RELAXATION

By C. H. Mayo, M.D.
Rochester, Minnesota

Uterine prolapse, as it is usually termed, is in reality a form of hernia. The great majority of uteri take the retroverted position with the onset of prolapse. The retroverted position of the uterus seems to be the common one in over one-fourth of women—apparently in the majority of them—without symptoms due to the position. It is possible for the uterus to undergo some degree of prolapse when it is in the vertical position; in such a case it moves forward nearer to the pubes and encroaches upon the bladder space. It is evident that a slight degree of descent of the uterus may occur without necessarily being considered pathological.

While there are many varieties of operations for the relief of the various types of uterine prolapse, there are only a few principles involved, although various surgeons have made many modifications in technique.

In the majority of cases of retroversion in patients between the ages of twenty and forty, in whom the symptoms are serious and growing worse, some form of external or intra-abdominal operation on the ligaments to restore the uterus to position is indicated.

For the cases of mild prolapse with retroversion or flexion, without other intra-abdominal complications for which an exploration would be advisable, a simple Alexander opera-

tion on the round ligaments or some modification of the original technique has proved very efficient.

With retroversion and descent difficult to replace, because of probable associated pelvic lesions or other abdominal complaint, the true condition of which had best be known, an intra-abdominal operation should be made on the round ligaments. If, as occasionally occurs, the cervix remains too far forward, the uterosacral ligaments or lateral folds of peritoneum should also be shortened to effectively bring the uterus to anteversion.

The interposition type of operation is efficient in the relief of partial uterine prolapse associated with extensive cystocele. We have secured the best results from this method in cases in which there is a firm uterus which does not come out of the vagina in the anteverted position at operation. This usually means an age limit within the forties. This operation relieves cystocele and descent or the first and second degree of prolapse. In the third or fourth degrees of prolapse it should not be chosen. When made before the climateric, it is advisable to divide and invaginate the tubes at the uterine horns to prevent any possibility of pregnancy occurring with such a misplacement of the uterus. The uterus being rotated from the extreme retroverted position to an anteversion—a rotation of 165 degrees—and the bladder separated from the anterior vaginal wall, the fundus of the uterus takes its place, the bladder resting on the fundus and posterior part of the anteverted uterus. Patients with relaxed vaginal outlet and soft uterus may continue to feel some protrusion and often think the cystocele is still present. If this operation is applied to women in the fifties, with a soft, degenerating uterus undergoing rapid atrophy, and in whom the torsion of the ligaments in anteversion still permits the uterus to be brought out of the body at the operation, it will undoubtedly fail in relieving, and another method should be substituted. With the interposition operation in such cases, we have seen, within a few

months, the whole uterus come out of the vagina, broadside, followed by the bladder, the condition of the patient then being worse than before operation.

In another class of patients, usually from fifty to sixty-five years of age, where hysterectomy has been made without successfully supporting the cervical stumps or vaginal terminus, prolapse of the vagina with cystocele and rectocele may develop six months to ten years following the operation. Some of these patients of advanced years are best relieved by total extirpation of the vaginal mucosa with a complete closure of the vaginal outlet by an extensive restoration of the perineum, leaving exposed only a small area of mucosa around the urethra. Occasionally a suprapubic operation is effective in reattaching the stump of the cervix or upper vagina to the abdominal wall accompanied by an extensive perineal closure.

The Kocher operation, or some modification of it, is occasionally made upon women in the forties, in which case the tubes are divided. But this method is usually reserved for women with atrophied uteri, past the change of life. In deciding what cases may properly be treated by this method, if when the cervix is grasped and pushed well up, thus restoring the vaginal position, the cystocele is thereby greatly reduced, the operation will probably be successful. If, however, the bladder has been torn loose from its uterine attachment, and the restoration of the uterus to high position does not elevate it, the Kocher principles of operation alone will not relieve the trouble.

As a matter of fact, it may be difficult to perform an operation which will securely fix the fundus of the uterus to and through the abdominal wall. The constant traction tends to cut out the sutures, and while there is a string of adhesions, the full support and elevation which apparently is satisfactory at the time of operation, may not be permanent. As in the Murphy modification, the uterus is drawn through the abdominal incision and bisected ante-

riorly and posteriorly down to the internal os. Each half is turned outward, and all of the mucosa dissected out above the internal os, leaving about a half thickness of the uterine wall. The peritoneum of the abdominal incision and the recti muscles are sutured all around the uterus at the level of the internal os. The aponeurosis is separated from the recti muscles opposite the projecting uterus. Each half of the fundus is turned outward over the recti muscle and beneath the aponeurosis to which they are secured, by three mattress sutures on either side (Fig. 1). The aponeurosis itself and the recti muscles are now closed, and the aponeurosis over the cervical uterine tissue is again caught to it by two deep sutures. The abdominal wall is closed without drainage. The sutures which include the uterine muscle tissue should not be drawn tight since the tissue easily cuts through. We have used silk and chromic catgut for sutures. It differs from J. B. Murphy's method only in placing the uterine tissue over the recti muscles and under the aponeurosis, leaving thereby a smoother abdominal wall, and, I believe, makes a stronger support. After all, it is not the prolapse of the uterus, nor the varicose ulcers and erosions upon its exposed surface, but the cystocele and the malposition of the bladder, which are the cause of the patient's discomfort. Such ulcers and erosions as may be found are seldom painful, and the exposed and vaginal mucosa becomes so near like skin that it is probably less irritable than it frequently is when undergoing the senile atrophy of the mucosa of the vagina at the menopause without exposure to the air (Fig. 2).

For a large group of cases of the third and fourth degrees of prolapse in patients between forty-five and sixty-five years of age, often with atrophy of the uterus and distension of the vaginal outlet, the interposition type of operation is not indicated. For such cases with separation of the bladder from the uterus and a large cystocele, in which the Kocher operation is also not indicated, and the atrophy of uterus

and ligaments too extensive for any intra-abdominal support to be secured, we have long practised the following very effectual method of securing relief:

The cervix is grasped with two pairs of vulsellum forceps and drawn well out of the vagina. A pear-shaped incision is now made with its apex one and one-half inches below the external urinary meatus. It passes down each side of the cystocele and around the cervix (Fig. 3). The sides of the incision are grasped and the vaginal wall readily separated from the bladder by blunt gauze dissection. The apex of the vaginal flap attached to the anterior lip of the cervix is turned down and the bladder rapidly separated by gauze dissection from the front of the uterus. As soon as the peritoneal fold is reached it is incised and divided laterally. The blunt gauze dissection now separates the posterior vaginal wall from the uterus at the side and on to the broad ligaments. The sharp fork retractors are now used to draw the fundus of the uterus out of the incision, as in an ordinary hysterectomy, and the cervix is restored within the vagina. The broad ligaments are fully spread out on each side. Unless the ovaries are diseased, they are not removed. A heavy hysterectomy forcep, with long blades, now grasps each broad ligament. The uterus is divided a half inch from the forceps and two more pairs of forceps are applied, one on each side, with their tip catching the cul-de-sac behind the cervix. The uterus is then cut entirely away (Fig. 4). When the tissues are not sufficiently relaxed for easy approximation, a little of the lateral wall of uterine tissue may be left attached to the broad ligament.

If there is any tendency of the sigmoid or omentum to prolapse, it is held back by a long pad of gauze inserted into the peritoneal opening. The pairs of forceps, two on each side, are now approximated laterally, and a running mattress suture of chromic catgut is applied, which passes back and forth behind the forceps completely through both ligaments at such a distance as to tighten the broad ligaments (Fig. 5).

Approximation of from one and one-quarter inches to one and one-half inches of these ligaments is secured. The method of suture is applied so as to interlock and prevent the inward slipping of any vessels. When the suturing reaches the round ligament, it is caught into the angle of dissection where the bladder has been separated from the anterior vaginal wall. This suturing extends backward on each side from this point, catching into the broad liagments and then on each side into the angle of the depth of the dissection, thus compelling the bladder to rest on the broad ligaments.

The loose ends of the exposed broad ligament are now approximated, by a running buttonhole stitch extending back to the perineal position and the sides of the vaginal mucosal flaps, and closed by a running catgut suture in a submucous manner (Fig. 6). No sutures are exposed. By such an operation one secures all the advantages of the interposition operation without the disadvantages of atrophying uterus and muscles, which will not support traction. The complete elevation of the bladder is secured, and it rests on the broad ligaments which make a complete transverse pelvic support. Cystocele cannot form between the pubic bones and broad ligaments, because their position is secured by suture. Formerly the broad ligaments were passed by each other, overlapping like a double-breasted coat, and two rows of sutures were required. The present method is somewhat more simple, as effectual and safer, as no ends of vessels are left within the pelvic peritoneum. Perineal restoration is of course included in all operations for prolapse. These patients are usually confined to bed ten days and remain slightly longer at the hospital.

DISCUSSION

Dr. Henry T. Byford, Chicago, Illinois. — Prolapse of the uterus is a very extensive subject. It has to do with

Fig. 1.—Suture of aponeurosis to uterine muscle.

Fig. 2.—Cross-section of suspension operation.

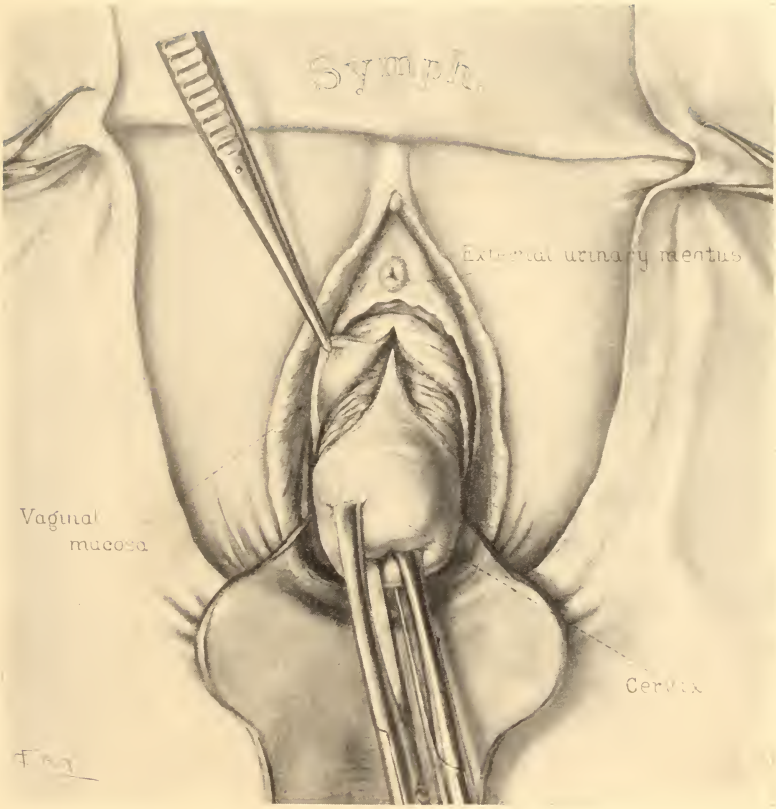


Fig. 3.—Primary pear-shaped incision for vaginal hysterectomy.

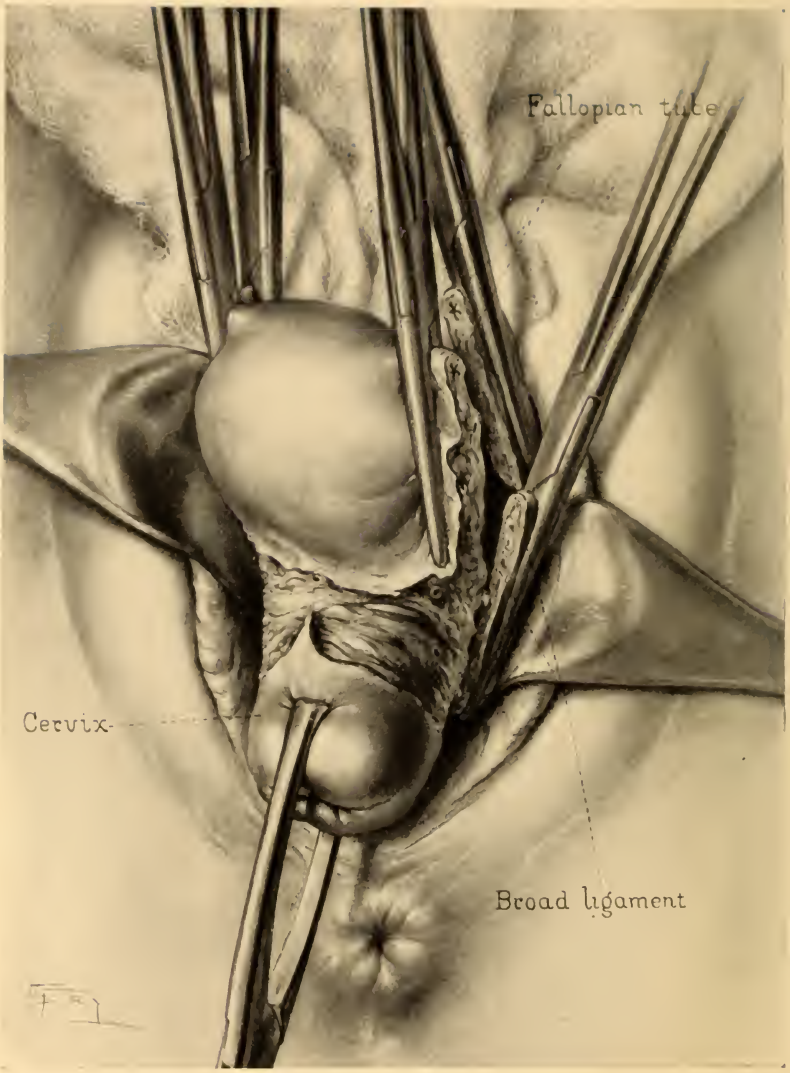


Fig. 4.—Excision of uterus and clamping of broad ligament.

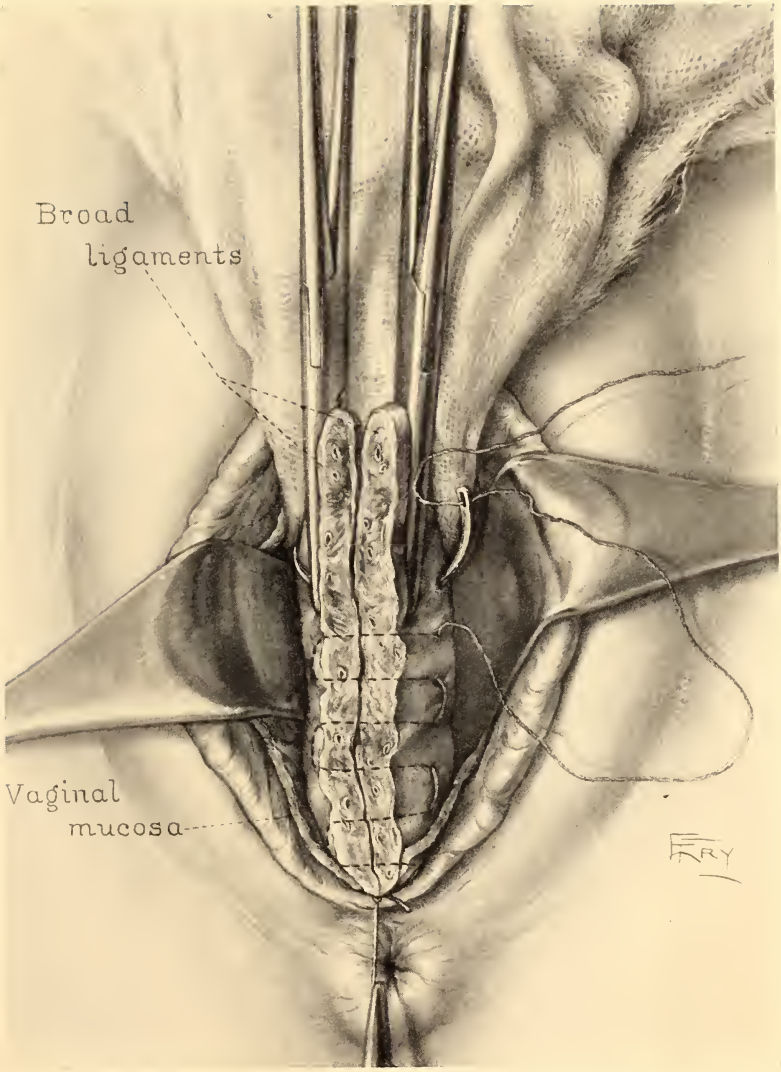


Fig. 5.—Broad ligaments approximated by running mattress suture.

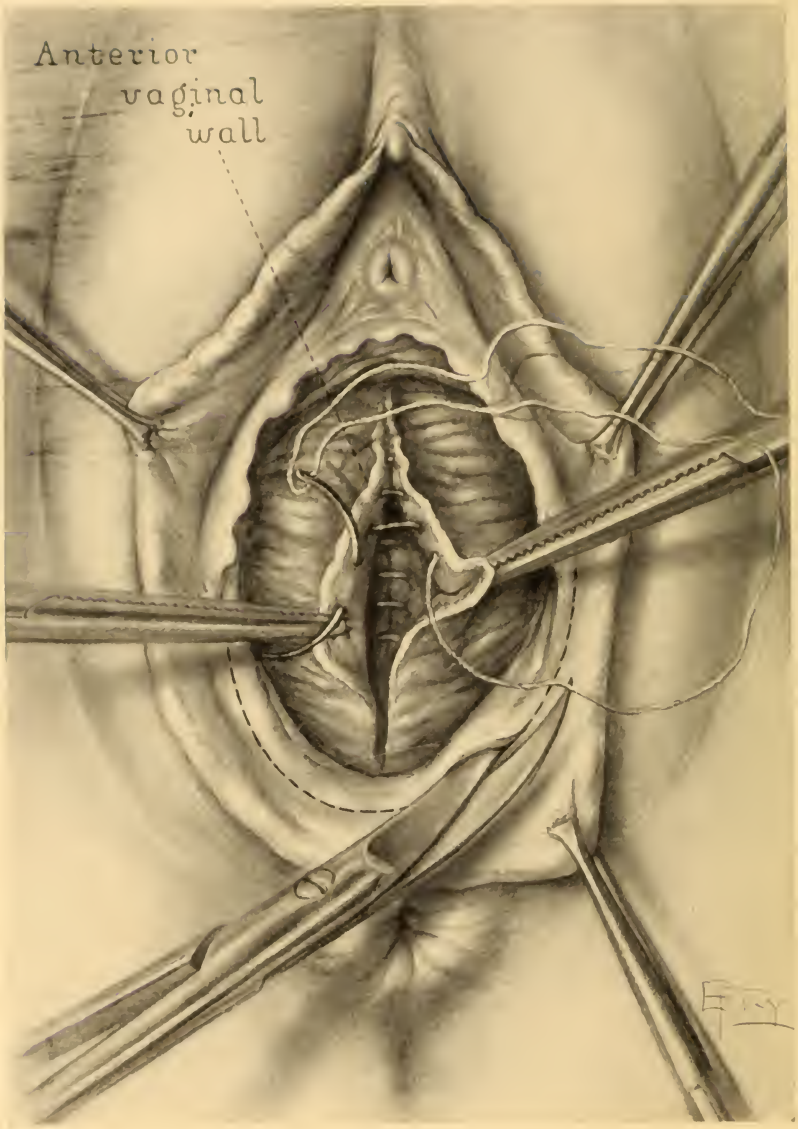


Fig. 6.—Incision of perineal region with closure of anterior vaginal wall.

lesions everywhere else in the pelvis rather than in the uterus, which is seldom sufficiently enlarged or diseased to rank as a primary factor. Dr. Mayo's operation is for extreme cases in which practically all of the supporting structures have lost their function, and as the uterus is the meeting-place of the affected structures he removes it in order to be able to get at those structures and give them new attachments.

In treating all but these extreme cases it is necessary to individualize rather than group them. In some cases there is a general weakening of the pelvic supporting structures due to general conditions of the system; in others a weakening due to local conditions; in the majority there is a primary deficiency of one or more of the supporting structures with secondary or subsequent lesions that grow progressively worse under the influence of abdominal pressure. Therefore, instead of recommending certain operations or combinations of operations for uterine prolapse, as is so often done, it would greatly simplify the treatment to recommend certain remedies or operations for existing deviations or deficiencies of the pelvic supporting structures. Such remedies or operations might have to do with the general system of the patient, her mode of life, her age, her hereditary deficiencies, etc., as well as local surgical treatment.

Many cases might be described, if time permitted, of different kinds of cases and different kinds of causes, different methods of development and different classes of complications. Dr. Mayo's operation is for the worst and yet for the simplest kind of cases, viz., those which have gone through one of the many methods of development but have finally resulted in a failure of all or nearly all of the pelvic supports. His treatment is equally simple, viz., a removal of the uterus and a drawing up or together of the deficient structures and suturing them in such a way that they will act as supports. The mere removal of the uterus and drawing the parts together would be of no use.

Dr. R. S. Hill, Montgomery, Alabama.—I am in perfect accord with Dr. Mayo and Dr. Byford in not advocating any one operation for every case of uterine prolapse. An operation that is indicated in one case may not be at all suitable in another. Indeed, success in the management of this condition depends almost, if not quite as much, upon the surgeon's ability to select the proper procedure in each case as upon his capacity to correctly execute the operative technique that is indicated.

The majority of cases of procidentia uteri, I am quite sure, occur after the menopause; at that period of life when the general physical tone of the body is beginning to weaken.

Now, as a preventive of uterine prolapse, we should go back to the growing period of a woman's life—to her girlhood—and insist on as near as possible perfect physical development, to the end that there may be a sufficient reserve strength acquired to, in a measure, compensate for the natural loss of power that comes with old age. It is my firm conviction that the physical state is too frequently neglected in our schools and that our girls' nervous systems are developed out of proportion to and at a disastrous expense of their physical strength. I am also persuaded that the demands of present-day society and the forms of modern dress, particularly the use of the corset, on the developing girl, has a most pernicious and damnable effect on her future health. Reaching womanhood with a supersensitive nervous system and subnormal physical powers, she is illy prepared to perform the many functions of life, particularly those peculiar to her sex. When she becomes a mother she sustains an impairment of her powers of resistance which may or may not be sufficient to become symptomatically manifested until it is added to by the natural decline of both muscular and nervous tone that comes with approaching old age.

It seems to me that the truth of what I have just said has been brought to me in a practical way. Living in the black belt of Alabama, where the colored people are numerically greater than the white and do fully 90 per cent. of the manual labor, I have rarely seen procidentia uteri in members of that race. If those women were not so well developed physically, it occurs to me, that this condition would be more common in them than in the white women, for as I have indicated their duties as members of the laboring class call for much straining efforts—efforts that tend to produce uterine prolapse.

Regarding the operations that have been proposed for the cure of the condition, I wish to refer only to the method devised by La Fort, as it has not been mentioned and I have had some very excellent results from it in a class of cases that I may describe as old, fat, flabby women who cannot bear any prolonged operation or operation of more than minimum degree of severity. The operation consists in stitching the anterior and posterior walls of the vagina together after parting them thoroughly from the cervix uteri to the outlet of the vagina, leaving

a small space on each side for the escape of any discharges from the uterus. As a rule it is advisable to amputate the cervix. I have resorted to this method quite a number of times and have never known of a return of the trouble. I have in mind at this moment two old ladies in my city on whom I did this operation ten or twelve years ago. They are now in the neighborhood of seventy-five years of age and comparatively active, whereas before their operations they were hardly able to leave their rooms. I feel that I am warranted, from my experience with this operation, in recommending it to you.

Dr. Herman J. Boldt, New York City.—It is evident that there is no panacea in the way of an operation in all cases; that is, one operation will not cure all patients. The operation must be suited to the individual patient, and not the patient to the operation. I do not propose to dwell upon the various types of operation as it is unnecessary to do so.

I would say with regard to the use of a pessary, that I have not yet seen any patient who had any degree of decensus at all, with separation of the paravaginal tissue, so that we would have a fair degree of cystocele, that has been cured by anything short of surgical intervention. The operation must necessarily be applied according to the age of the patient.

Dr. Hill has mentioned the La Fort operation. In a certain class of patients, women who are advanced in years, where the vaginal canal is of no further use (I have reference to widows), and there is no probability of a subsequent marriage, I prefer to do an operation where we can positively guarantee a cure, and that is the only operation we can do unless it be the La Fort operation, namely, the operation of the late Dr. Edebohls, which means a complete extirpation of the uterus and vagina. I have done quite a number of these operations and have not seen any bad results, but absolute cures in every instance. With this operation you can guarantee a cure. You cannot guarantee a certain cure by any other method of surgical intervention.

Among the other operations in women who have passed the child-bearing period, the proper execution of the technique by the Schauta-Wertheim or Watkins operation gives most excellent results. The only point, however, I would make in that class of operations is that amputation of the cervix should be made at the os internum; you cannot make amputation of the vaginal portion of the cervix, but there should be a high ampu-

tation of the cervix done. Furthermore, it is necessary in all large uteri that a wedge-shaped piece of the body of the uterus be excised, so that we do not leave too large a uterine body. If you leave a large uterus you will have trouble. It is necessary to take out a sufficient piece of such uterus. During the child-bearing period I do not know of a better operation than the Gilliam operation, properly executed.

Dr. Charles A. L. Reed, Cincinnati, Ohio.—This very interesting paper of Dr. Mayo impresses me with the fact that, in all remedial measures which we have devised and which we are practicing, we are dealing with end results and ignoring primary causes. It seems to me, to that extent, the surgical measures usually adopted are illogical. It is true, we do have to deal with these end results and they must be reckoned with. The woman must be restored to efficiency and to do so we must resort to various expedients, some in one case, and some in another, each varying according to the indications of the individual case. But one rather significant thing has appeared in this discussion, and that is, that following the various devices, there is liability, if the uterus is restricted, for the hernia to return. What is in that hernia? What returns? The uterus is out. It is the intestines that return. That is what we have in the hernial sac in the first instance. The uterus is simply a part of the hernial wall; the intestines are down, and they are the initial factor, and superimposed weight forces the uterus, the bladder and rectum downward.

Only three days ago I operated on a case in which I had a complete hernia of the vagina. I thought, in the first place, it was a pronounced rectocele, but the rectal wall was intact. But in this case the intestines were down; there was a large cervix which was likewise outside. To repair these cases in a logical manner it is necessary to deal with the initial cause, to restore the pelvic diaphragm, to take off the remaining weight of the displaced and descended intestines. I called attention to this principle in my paper before the American Medical Association two years ago, and my subsequent practice has confirmed this view, that in dealing logically and technically with this condition, we must deal with the intestinal condition which is the initial factor in the production of the trouble. All these expedients are very good. I am very glad to see the technique for repair of the perineum, something which ought to be done in all instances for the completeness of the method, and I am

specially pleased because I described precisely that technique in my book thirteen years ago, and it is one I have been adopting from that time to the present with increasing satisfaction.

The question of accessibility is possibly one that should be considered in operations such as this. We cannot always get the broad ligaments down so we can stitch them together like this, even when we have pronounced prolapse. In many cases I have been perfectly satisfied to do the operation above through a Pfannenstiel incision, exposing the entire pelvis, where I can deal with all the conditions in detail.

Dr. W. P. Carr, Washington, D. C.—It seems to me, we are getting so scientific in this discussion that we are getting away from the paper. If we seek the initial cause we must go farther back even than the childhood of the girl. We will have to go back to her parents and grandparents. As long as we have consumptives and weaklings for grandparents, we will have these flabby young women. And flabby young women are worse than flabby old women for two reasons: first, because older women, when they get flabby, are not active, and it does not take much to hold the uterus or to prevent a hernia. We ought to call the condition a pelvic hernia rather than a prolapse of the uterus. We can do much good by using tampons and astringents for light prolapse in young persons and get even better results than in old women. I have seen many cases of slight prolapse of the uterus in young women. We do not see procidentia, as a rule, except in the old. But we do see many flabby young girls who have gastroenteroptosis, perhaps floating kidneys, and prolapse. It is useless to operate on them, but we have seen many of them relieved by the use of tampons, proper support and diet, and hygiene. I never use a pessary, although I think it may do good in certain cases. Tampons soaked in tannic acid and glycerin are better, I think, and attention to the general health of the patient is indispensable. The fact remains, however, that we can do much good by operating on cases of general ptosis.

Dr. Howard A. Kelly, Baltimore.—I am interested in this discussion, as I have to deal with many such cases. The term hernia is correct and appears even in the older writings on uterine displacements going back two centuries. Among the modern, Berry Hart is conspicuous in its use in his atlas. That prolapse is not due to an enfeebled musculature is shown by the fact that this is notably common among the sturdy field laborers

of Europe; the worst cases are seen in European clinics. In our treatment we must individualize these cases.

Dr. Mayo has pictured the most aggravated type of cases in which operative failures are infrequent. It has been my own habit in this group to do some such operation as this: To use round ligament to pull the uterus forward. Starting a silk suture in the deep fascia I run it, skipping across the bladder, and then embrace the round ligament and return and tie in the fascia; that done on both sides holds it forward. You then utilize the uterosacral ligaments or substitute to pull the cervix back, or rather to prevent decensus. The lower operation, which must be done first, consists in an extensive fascial resection of the anterior vaginal wall, putting in apron bar in the anterior wall. Then a splendid levator operation is done on the posterior wall, resecting and uniting the fascia here too.

I heartily welcome this additional procedure described by Dr. Charles Mayo, which he attributes to his great patron saint Hippocrates, with some modification by himself, as I am sure it will be a help to me in the worst cases where we meet our failures.

Dr. Mayo (closing).—I have been struck with the usual unanimity of opinion among us gynecologists. (Laughter.) I agree with what Dr. Boldt has said regarding the second pregnancy in the case of a young woman with the third and fourth degrees of prolapsus, which is not frequently seen. If she has cystocele it is better not to try this operation. We get better results with this operation in the first and second degrees of prolapse after the second pregnancy.

In the Northwest we have a large number of women from Scandinavian countries, who not only do their housework but work in the fields. In fact, many of them do more work than the men. There may be some special reason other than cystocele for operating on them. They are not ordinary American women who have various degrees of prolapse which require a series of operations. In extreme cases of prolapse, with the vagina wrong side out, the patients may be cured by complete removal of the vagina. Some of these patients may have reached the age of sixty.

We have been doing this operation for twenty odd years. I do not know whose it is. Hippocrates may have devised it.

POINTS IN THE SURGICAL TREATMENT OF ACUTE INTESTINAL OBSTRUCTION

By Samuel J. Mixter, M.D.
Boston, Massachusetts

In 1912, Dr. McGlannan read before this Society a most thorough and interesting paper on Intestinal Obstruction. The discussion of the paper occupies in the *Proceedings* much more space than the paper itself, although the subject of the use of eserin occupies an undue amount of space. At the same time, I feel that the last word has not been said on surgical treatment of acute obstruction, and it is to emphasize a few of the important points that I venture to present this paper, which is suggested by a study of a very considerable number of acute intestinal obstructions occurring in our private practice within the last five years. These cases are 42 in number and do not include any cases of chronic obstruction from whatever cause. They are as follows: Cancer in the large intestine 22, adhesions 12, megacolon 2, gall-stone ileus 3, omphalomesenteric band 3.

Just a word on the indications for operation. Whenever it seems probable that the bowel is mechanically obstructed, the abdomen should be opened at once. It should always be remembered that the symptoms come earlier in obstruction of the small intestine than in the large and that less time is needed for severe lesions of the bowel in the upper part of the intestinal tract. One point that was emphasized in the discussion referred to, was the necessity of emptying the bowel above the constriction in cases where there was

considerable or great distention. In late cases where there is danger of paralysis of the muscular coat or where it is already present, this may be done by the use of a tube tied in for a period sufficiently long to insure the return of the intestine and its contents to a fairly normal state. In the large intestine, the opening may remain for practically an indefinite time without damage and the opening, if properly made, will generally close of its own accord. In the small intestine, however, a long-standing opening means starvation of the patient, a terrible irritation of the skin and a difficult and dangerous surgical procedure for its relief. Some method should be devised in these cases that will make the reëstablishment of the canal simple and under the control of the operator. In several cases I have been able to do this by stitching the walls of the small intestine together for three or four inches, thus making a sort of double-barrelled gun with its opening on the surface. A pair of clamps, applied later in the old-fashioned manner of cutting the spur, is safe and generally is sufficient for the free passage of the fecal stream and the spontaneous closure of the external opening. If properly done, this procedure is a practically safe one, although it may be said that it is in a way working in the dark. If the external opening does not entirely close, the bowel is able to pass along most of its contents and a comparatively slight and safe operation completes the cure. The higher up the obstruction, the more dangerous is the artificial anus, while the risk of auto-intoxication from an immediate reëstablishment of the fecal flow is less. Even an extensive resection and immediate anastomosis may be done with less danger than in the lower gut.

It is in the cases of obstruction in the small intestine caused by dense inflammation, adhesions, or knots which are not infrequent, that lateral anastomosis, side-tracking the obstruction, gives a most satisfactory and brilliant result. The operation is not always an easy one, for the

intestine above with its long-standing obstruction is often enormously hypertrophied, sometimes with walls as thick as sole leather and the size of the forearm, while the intestine below to which it must be united may be no larger than the little finger. In spite of the difficulties, however, success is almost certain even where acute symptoms have been present for some days. I have had a considerable number of these cases and they have all recovered promptly and remained well for years.

For some reason, that I never could understand, even the large tube tied into the large intestine will not always work and the distention will persist. The intestinal tract unfortunately is not a stiff tube with regular coils, and though the surgeon may be a good "plumber," he will occasionally fail on account of the nature of the tube on which he is working.

Obstructions that are near the cecum are, to my mind, most difficult to manage. The obstructed small intestine must be given an outlet. For reasons stated above, an enterostomy opening in the small intestine is unpleasant and troublesome, complicating the subsequent operation for radical cure on the affected portion of the bowel. A side-tracking operation by lateral anastomosis between the ileum and the sigmoid or some other convenient part of the large intestine is most useful in fairly early cases, but even here the immediate result is not always as good as an enterostomy, and where there is much distention it is often found on reopening the abdomen that many troublesome adhesions have formed which may make radical operation a difficult one. I have observed this condition in a number of cases where distention had been the factor, whereas, if there has been but a little distention, these adhesions have not been present. Whenever obstruction in the large intestine is well away from the cecum, a cecostomy is the surest method of relief and gives the least trouble in a subsequent operation.

And now in regard to the method of approaching the obstructed bowel. To my mind, one of the greatest advances in the treatment of this most serious condition is the use of spinal anesthesia. Although a simple enterostomy may be done and should be done with infiltration anesthesia, this does not as a rule admit of a thorough enough examination of the intestinal tract and location of and examination of the point of obstruction. Chloroform, ether, gas and oxygen, unless given to a point of complete relaxation, do not permit the examination of the abdominal contents without undue violence. We have all seen intestines forced violently out of our incision, becoming congested and ecchymosed, and even after they have been emptied and the operation completed, there is great difficulty in returning them to the abdominal cavity against the rigidly contracted abdominal muscles. With novocaine spinal anesthesia, we have a method which gives thorough relaxation. The shock is enormously less than with a general anesthetic on account of the ease with which the intestines are handled and the operation can be easily completed and the patient in bed before the anesthesia wears off. It is well known that under spinal anesthesia, and this is a most important point, the large intestine will often empty itself on the operating table through the relaxed sphincter and the surgeon and patient be saved a great deal of later trouble.

As soon as the abdomen is open, if the point of obstruction is not easily and immediately discovered, the distended loops should be emptied. After a trial of various methods, I have settled upon the trocar and purse-string suture as being the safest and most effectual. A number of such punctures may be made with slight loss of time, little soiling of the peritoneum and no shock to the patient.

When I began the use of a stiff tube, or better, a fairly stiff rubber tube, I felt that I had found the perfect method of getting rid of the intestinal "pea soup" and gas, but I soon found that the shock to the patient was out of all

proportion to the advantage gained. A method of emptying the large intestine that I have found most effectual in certain cases is the use of a long, preferably fenestrated rectal tube which is introduced by an assistant and, guided by the hand of the operator, may be easily passed even as far as the cecum. The intestine having been partially emptied, it is possible by touch and inspection to find the point of obstruction and its nature and the operation is completed before the spinal anesthesia has worn off. In many cases the surest way to save life is by the establishment of permanent colostomy, but this should never be done without the patient understands fully what the operation means. Personally, I am willing to take a very much larger risk of life in order to avoid this very unpleasant result. Many cases of artificial anus are so made that they can be fairly easily managed, but my personal feeling is that any risk of death is preferable. If an artificial anus should be made, remember that the umbilicus is the point which moves less with muscular action than any other point of the abdomen and the nearer the opening can be made to this point, the more readily can an adequate apparatus be fitted to the patient.

A large loop of intestine should be brought out so that the abdominal wall can be stitched together through a hole in the mesentery, and thus the two ends are later separated in such a way that the feces in the upper end cannot enter the lower part of the bowel.

It should always be remembered that in the late cases more lives are lost by doing too much than too little. The emptying of the bowel and drainage of the intestine are two important factors in addition to speed.

Early operation is easy and comparatively safe. In late cases the condition is a very fatal one, and we shall always have a certain number of these desperate cases, either from the objection of the patient to operation, the delay of the physician in charge, or our own mistake.

DISCUSSION

Dr. J. Shelton Horsley, Richmond, Virginia.—Intestinal obstruction, like when to operate for appendicitis or what to do for prolapse of the uterus, always elicits much discussion for there is no definite way of dealing with all cases. There are two types of intestinal obstruction that have made a deep impression upon me, largely on account of my own failures. The first type is the late cases with the small intestines dilated and filled chiefly with fluid contents. The intestines are paralyzed and even an enterostomy does not empty them. If they are handled roughly, death is inevitable, partly from the shock but largely from forcing the toxic material into the circulation. The dilated intestines should be emptied as gently as possible, usually inserting a trocar in the most prominent loop just as in tapping a gall-bladder. When the fluid is drawn off the collapsed loop can be raised, opened further, and a large rectal tube, or a large glass tube, can be pushed through this collapsed loop into the next distended loop and the material drained off in this manner. The loop of intestine that is being drained should be surrounded by gauze, but it must be remembered that in such cases there is intense hyperemia and a large degree of immunity from infection. Peritonitis is not likely to occur.

The other type of obstruction that I referred to is that in which a segment of intestine is injured, as in strangulated hernia, or in intussusception. If the gut is purple and edematous, even if not distinctly gangrenous, I believe it is better to excise it. Whatever view we may take as to the cause of death from obstruction; whether we believe with Hartwell and Fred Murphy, that it is from bacteria, or whether we follow the teaching of Whipple and Stone that it is due to a derangement in the mucosa, it is certainly true that the material which is absorbed by the affected loop is responsible for death. If the operator has a good technique in uniting the ends of the bowels after resection, the patient stands a much better chance of permanent recovery after resecting a doubtful loop than after returning it to the abdomen and draining, or trusting to luck. In four cases of intussusception in infants or children in my own practice two were reduced with some difficulty. One died a few hours later with a high temperature and profoundly toxic symptoms, and

of two in which resection and end-to-end suturing was done both recovered.

Dr. J. Garland Sherrill, Louisville, Kentucky.—I wish to emphasize what Dr. Mixter said about emptying the intestines, but I do not believe he mentioned gastric lavage as a preliminary to the treatment of intestinal obstruction. It is especially a useful procedure in cases of partial obstruction where the patients are developing symptoms of obstruction, with hiccough and depression. Removal of the fluid from the stomach will sometimes relieve these patients and save operation. If at the time of the operation for obstruction the toxic material is removed by emptying the stomach, the intestines are replaced more readily, and if the intestine is emptied on the table the patient will have a better chance for recovery than if these steps are not employed.

I do not believe that it is the damage to the gut that kills the patient. There is enough bacterial flora in the intestinal tract to destroy life. The gut is filled with this poisonous material. Dr. Horsley said that in young children it is the thickened intestine that causes the death of the patient. I do not believe that is true, but it is the shock of the operation and the poison already in the gut which determine the outcome.

Dr. W. B. Coley, New York City.—I only desire to call attention to one particular type of obstruction, and that is volvulus from a giant sigmoid. I have had a case which I think is worthy of being placed on record, and which I showed before the American Surgical Association five years ago. I was called one hundred miles to see the patient. The man had had attacks of partial intestinal obstruction during the last two years, preceding, but was relieved by catharsis. This time, however, he had gone nine days without any movement of the bowels. The abdomen was enormously distended; the temperature was 100 degrees and pulse 120. His family physician, Dr. A. Brayton Ball, and my associate, Dr. Downes, felt he would not be able to stand a big operation. The duration of the obstruction made it probable that it was the large intestine and not the small intestine which was involved. Under cocain anesthesia I made an incision over the sigmoid, cut down, and found an enormously distended sigmoid as large as a child's head, and I was satisfied in suturing it to the abdominal wall, putting in a trocar and drawing large quantities of gas. The next morning I enlarged the opening with a scalpel and a very

large amount of liquid fecal matter came away. The man went on very well for four or five days, and then began to pass fecal matter in the normal way. At the end of two weeks the fistulous area closed and he had normal stools per rectum. Three or four days later he began to have symptoms of obstruction again; fecal matter no longer passed by rectum. The abdomen became distended, and I made up my mind I was dealing with a giant sigmoid which as soon as it became distended by gas formed a volvulous and completely shut off the intestine. The man was rather advanced in years. It seemed to me, if we could get rid of the gas without doing a big operation and trying to resect the whole sigmoid or colon, it might be worth trying. I put in a little rubber catheter in the hole in the sigmoid, put a safety-pin in this way to hold it, and after relieving the gas in a couple of days he began to have normal movement. I then made a little silver apparatus the size of the catheter, and with a finger at the outer end, put a pin hole opening in the side sufficient to allow the gas to escape, but no fecal matter. He has been wearing that for seven years and is still in good health. He has had no recurrence of his symptoms.

Dr. Francis Reder, St. Louis, Missouri.—In connection with the case of giant sigmoid related by Dr. Coley, I wish to put on record a case of giant cecum. This patient was twenty years of age and was suffering from an intestinal obstruction that made an operative measure imperative. The condition disclosed was that of a cecal volvulus.

The cecum was dilated to the size of an ordinary toy balloon, it was wedged in the true pelvic basin and its peritoneal covering was ruptured in numerous places.

The delivery of the distended cecum presented serious difficulties, and was affected without a colotomy. After delivery was once accomplished a twist from left to right corrected the abnormal condition and permitted the cecum to be emptied of the incarcerated gas. The rotation in this case was due to a long free mesentery to both the cecum and ascending colon. After the cecum was restored to normal it was plicated where the peritoneum had ruptured and fixed with a few sutures to the abdominal wall. Patient recovered. I wish to say a few words concerning the surgical measure in the acute form of intestinal obstruction.

We are here confronted with an element of danger in the distention which is present, and the destructive energy of the

great masses of the hostile bacteria that are pent up in the distended bowel. I doubt very much if resections for this condition can be performed sufficiently rapid to warrant such a procedure. We have devices by which we can affect a quick juncture, but it is not with the device alone we are dealing. There is the mesentery to be considered. In gangrenous bowel conditions it is a surgical law that the resection extend well upon the healthy bowel. This leaves a large mesenteric area to be dealt with and it is here where the time will be lost.

Considering the existing toxemia of a patient suffering from acute intestinal obstruction it appears to be that such a patient can be better safeguarded by an excising of the diseased portion of the intestine with anchoring of the open ends of the intestine in the abdominal wound.

A Paul tube is to be introduced into both openings. Such a procedure will require very little time and can be accomplished under local anesthesia. If the patient lives the continuity of the bowel can be restored at a later day.

Dr. Alexius McGlannan, Baltimore, Maryland.—The point we tried to make a few years ago was that the important thing in cases of intestinal obstruction is early recognition of the obstruction, because if you operate before toxemia has taken place you can deal with the cause of the obstruction, relieve this cause, and restore the continuity of the bowel, thus curing the patient by the primary operation. When toxemia has developed you cannot think of relieving the patient at a single operation but must relieve the toxemia by a proper enterostomy above the seat of obstruction and washing out the stomach to remove the intestinal material. In my paper among the possible causes of death in obstruction, there was suggested a poison of a chemical nature. This is probably some substance related to cholin, because experimentally injections of cholin are followed by the symptoms of an acute obstruction (toxemia). Cholin is a common constituent of the body. Acetocholin is a material constantly present in the body and easily broken up into cholin and other substances. Such a cholin decomposition takes place in the obstructed loop of bowel. The remedy at our hands to counteract cholin is adrenalin, because adrenalin is a physiological antagonist of cholin. In the postoperative treatment, if we use large quantities of salt solution subcutaneously with adrenalin, administering the adrenalin in the manner recommended by Crile in the

treatment of shock, we will often relieve the depression caused by the toxemia. The salt solution should be given slowly through one or two small-caliber needles.

Dr. Mixter (closing).—These cases were all late ones, and they occurred in my practice and in the practice of my sons. They comprise 22 cases of cancer, 12 postoperative adhesions, 2 giant sigmoids, 3 gall-stone ileus, and 3 omphalomesenteric bands. We did not consider any cases of paralysis from inflammatory conditions nor strangulated hernias.

CANCER OF THE PROSTATE

By E. S. Judd, M.D.
Mayo Clinic, Rochester, Minn.

It is difficult to estimate the frequency of the occurrence of cancer in the prostate from operative records, since the cancerous tumor in this gland is often small and may not produce local symptoms. Moreover, in many instances, the metastatic lesion is discovered before the primary focus. It is generally reported, however, that one case in five (20 per cent.) of prostatic enlargement causing obstruction in old men is due to cancer. The records from our clinic will bear out this percentage.

There have been 878 prostatectomies performed in the Mayo Clinic up to the present time, December 1, 1914. In 93 of these cancer was found. In addition to these (from January, 1910, to December 1, 1914), 84 cases were diagnosed cancer, but were not operated on because they were too advanced for any operative procedure, or because the chances for cure were not good enough to warrant interference in individuals who were fairly comfortable.

A similar ratio of occurrence is found in the autopsy records. Kümmell[1] reports that in 38,472 autopsies there were 204 diseased prostates, 43 or 21 per cent. of which were carcinomatous, while Gebele[2] in a report on the material

[1] Die Diagnose und Behandlung der bösartigen Prostataerkrankungen im Anfangsstadium, Ztschr. Urol. Chir., Berlin, October 11, 1913, ii, 18–35.

[2] Ueber das Prostatacarcinom, Beitr. z. klin. Chir., 1913, Bd. lxxxiii, 657–667.

at the Pathologic Institute of Munich says that 38 per cent. or more than 1 in 3 cases of prostatic lesions were carcinomatous.

Age of the Patient. In our series of 93 cases operated the youngest patient was fifty-one, and the oldest eighty-two years of age.

Number	between	50	and	60	years,	21
"	"	60	"	70	"	34
"	"	70	"	80	"	36
"	"	80	"	90	"	2

In our series of non-operated cases there were a few patients just under fifty years of age, but the cancer was too far advanced for operation. The age incidence gives no suggestion as to the nature of the trouble, since it corresponds very closely to that of benign hypertrophy.

Symptoms. In many cases the symptoms do not differentiate early carcinoma from adenomatous hypertrophy. The pain associated with cancer is usually much more marked in the region of the prostate. It is more constant, and is not necessarily associated with micturition. This localized pain is supposed to be due to tension within the capsule. It becomes more marked locally and as the disease progresses also radiates into the extremities and to the back. Pain of this character does not occur in other lesions of the prostate, and is somewhat characteristic of cancer.

There is a marked variation in the duration of symptoms. A gradual onset, growing steadily and rapidly worse without attacks of acute retention would seem to favor malignancy. The onset and length of time of symptoms may be identical with the ordinary case of benign hypertrophy. Nine of our patients had had symptoms only six months, while 8 had been troubled more than ten years, 2 of these more than fourteen years. More than half of the patients had had trouble between one and four years. In all probability in patients having symptoms for a number of years the

early symptoms are due to hypertrophy which often occurs at the same time.

DURATION OF SYMPTOMS.

6 months or under	9 cases
6 months to 1 year	2 cases
1 year to 2 years	20 cases
2 years to 3 years	14 cases
3 years to 4 years	10 cases
4 years to 5 years	7 cases
5 years to 6 years	9 cases
6 years to 7 years	5 cases
7 years to 8 years	3 cases
8 years to 9 years	4 cases
10 years	5 cases
12 years	1 case
14 years	2 cases

Frequency of urination was one of the most prominent symptoms and usually the first to appear. In many cases frequency and difficulty were noted at about the same time. The frequency was usually first noticed at night. I believe this symptom becomes most marked in cancer involving the entire prostate. A number of our patients voided every few minutes. Difficulty in urination in cases of cancer is not as prominent a symptom as in the cases of benign hypertrophy. It was present, however, in all but 14 of the 93 patients. In 3 there had been complete retention and a suprapubic stab drain had been made previous to their coming to our clinic for examination. One patient had suprapubic drainage made two years before coming for operation and had passed no urine through the urethra during that time. Only 2 of our patients complained of dribbling. Dribbling was more common in the cases of benign hypertrophy.

BLOOD IN THE URINE. Hematuria was present in 21.9 per cent. of the cases. One patient had noted blood in the urine every day since the symptoms began three years previous. In most of the cases the amount of blood was small and noted only occasionally; it was a comparatively late symp-

tom, being noted, at most, only a few months before the patient came for examination. In none of the malignant cases was there a sharp hemorrhage and the passing of clots, which occasionally occurs in benign hypertrophies. Bleeding did not occur in any of our early cases.

Forty-nine of our patients had used a catheter, 19 had used it for one month or less. In several instances it had been used only once or twice. Three patients had been using a catheter for about one year, 1 for two years, 1 for four and one-half years, 1 for seven and one-half years. One had a permanent suprapubic drainage for two months and 1 for three months.

It has been interesting to note, but difficult to explain, that in our cancer cases, as a group, the specific gravity of the urine has been unusually low, in many instances ranging from 1002 to 1005 in individuals generally in good health.

Aside from the character of the pain, which in cancer is apt to be constant and independent of micturition, the symptomatology of cancer in the early stages is almost identical with that of benign hypertrophy, and the physical examination may reveal the first signs of malignancy.

Physical Findings. A general physical examination usually shows a healthy, robust individual. Rectal examination may reveal a small prostatic gland, or, if hypertrophy is associated with the cancer, the enlargement may be quite marked. If on palpation the surface of the prostate is rough with hard nodules, it is always suspicious, since in the benign cases the prostates are nearly always smooth unless there is associated inflammation or calcareous deposits in the substance of the gland. In benign cases they are often lobulated though their surfaces are smooth. In cancer, if the surface is smooth, the prostate is very hard.

It is sometimes impossible to discover malignancy when it is associated with hypertrophy, or to distinguish malignancy from chronic inflammatory prostatitis. In 6 of our cases the gland was soft, due to the fact that adenomatous

hypertrophy predominated and the cancer was not felt. In many of our cases a hard nodule could be felt in one lobe while the other showed no changes.

The characteristic cystoscopic picture is a small prostatic bar, unless adenomatous hypertrophy exists at the same time. The mucous membrane of the urethra or bladder is not ulcerated, except in the late cases. Cystoscopic examination is of great aid, especially in ruling out those cases too advanced for operation. However, this examination should not be made in evidently hopeless cases since the reaction following may be quite severe.

The chief factor in the clinical diagnosis of cancer of the prostate, whether or not it be associated with other conditions, is an irregular, hard "feel" to the surface of one or more lobes of the gland. The type of pain may be suggestive, but is not diagnostic.

A study of our specimens removed at operation showed that in about 75 per cent. the cancers were associated with hypertrophy and in the remaining 25 per cent. the cancer occurred in prostates in which we were not able to find evidence of hypertrophy. In the group of cases associated with hypertrophy the symptoms and findings were often those characteristic of benign hypertrophy, and in several instances the cancer was not discovered until the specimen had been carefully sectioned. In these cases the malignant process apparently always started in the posterior lobe, and often was distinctly separated from the rest of the gland which was not involved. The tumor produced by benign hypertrophy in some of these cases is quite as readily enucleated as in the ordinary case, and unless the posterior segment is enlarged the malignant process may easily be overlooked. This error has occurred once in our experience. A large bilateral and median hypertrophy was removed in the ordinary way. At the time of the patient's death, a few weeks later, the wounds were healed, and the functional results were good, considering the short time that had

elapsed. At autopsy a small, hard cancer entirely capsulated was found in the posterior lobe. I believe that the cancer in this case had nothing to do with the fact that the patient did not live longer, but the experience served as a good lesson, and since that time in every supposedly benign case after removing the hypertrophied lobes the remaining posterior lobe and posterior part of the capsule are carefully palpated for any evidence of hard and irregular nodules.

If the hypertrophied part is more firmly attached posteriorly or shells out with difficulty, there is always suspicion of cancer. If the cancer alone exists in the prostate it is usually easier to distinguish. The tumor is small and hard and seems to involve the entire gland. In such cases the patients have considerable constant pain not associated with urination, unless there is tendency to stricture, a condition which is not uncommon.

The growth does not often extend into the bladder, so that, from a suprapubic exposure, the bladder may appear quite normal. If an effort is made to pass a finger down into the prostatic urethra a firm, hard rim is felt, and if we try to remove this rim, it is found to infiltrate into all the surrounding structures and cannot be removed except in small pieces. These cases are the least favorable for operation. Often, in the apparently early cases, the malignancy extends beneath the trigone into the seminal vesicles and as high as the ureteral orifices.

Treatment. Radical operations for this condition have gained favor slowly, not because it is impossible to remove the growth with a reasonable degree of mortality, but largely because it is impossible to do a thorough radical removal of the cancerous prostate and the adjoining part of the bladder without completely destroying the mechanism of urinary control. We must also consider the fact that the conservative prostatectomy may cure a certain percentage of the early cases, and at the same time give satisfactory functional results. Before undertaking the radical operation,

the patient should understand that he will have no control of his urine. We see very few people who are at all comfortable with a total incontinence of urine.

Patients who are incurable, but fairly comfortable either with or without the catheter, should not be operated on, though certain of these who have not used catheters should be advised to do so, since they may be made more comfortable by its use. When the patient's symptoms are extreme or the use of the catheter causes great pain, even if the prospects for complete cure are not good, they should have a palliative operation. In many of the cases the obstruction to urination is due to a benign hypertrophy. Removing the obstruction and also a part of the cancer will entirely relieve patients for a time and they will be much more comfortable than with any other procedure.

The mortality under these circumstances is little more than in the benign cases, the functional result is quite as good, usually the wounds heal just as promptly and the pain is entirely relieved. Many of these patients live several years in comfort. Kümmell states that these patients receive benefit from *x*-ray and radium.

End Results. Through correspondence and personal communication we have been able to trace 82 of the 93 patients operated on. In all of these an ordinary prostatectomy was done either by the suprapubic or perineal method. Of these

8 lived more than 3 years
12 " " " 2 years
13 " " " 1 year
24 died within the first 6 months.
5 " time unknown.

Patients still living after 6 months	3
" " " " 1 year	7
" " " " 2 years	4
" " " " 3 years	3
" " " " 4 years	2
" " " " 9 years	1

The patient who is living and free from symptoms nine years after the operation, had a very small cancerous nodule removed. Many of the patients living at the present time are entirely free from symptoms. Three who were operated on within the year, yet more than six months ago, are well. In the cases of recurrence, hematuria was one of the first evidences of the recurrence. Difficulty of urination was also an early symptom and became rapidly marked, necessitating suprapubic cystotomy in a number of cases. Several patients lived more than three years without evidence of trouble, when there was a return of all of their symptoms.

PROSTATECTOMY UNDER LOCAL ANESTHESIA

By Carroll W. Allen, M.D.
New Orleans

In the operative relief of hypertrophy of the prostate we have, in the great majority of cases, to consider certain factors which are not, as a rule, involved in other surgical procedures; namely, those of age, as most of the cases requiring surgical relief for this condition have reached or passed middle age, and many of them are infirm or weakened by suffering and infection. In the old and feeble, prostatectomy is a formidable operation, though not attended by a greater mortality than that following any other major operation in the same class of patients. However, it may even show a more favorable comparison by observing certain methods in the handling of these cases.

Surgical technique has reached such a stage of perfection that in the more commonly performed operations it would seem difficult to suggest improvements in the recognized methods of procedure in typical cases. Improvements will come, but I believe that they will be more in the preparatory treatment, general handling of the case, and refinement in details, rather than in the general principles involved in the operation. One of the notable advances recently introduced as a general surgical procedure is the anoci-association of Crile. This I believe to be a factor of great consequence, particularly when applied in old and feeble patients, as it prevents shock-producing impressions from the field of operation from reaching the higher nerve-centers.

The method which I wish to present today is the result of a process of gradual evolution and improvement in handling these cases. Beginning with the two-stage operation and the adoption of the anoci-association principles to control shock, and the logical addition of adrenalin for the control of hemorrhage, it has gradually progressed to the point of complete elimination of all general anesthetics, which are now never necessary, but which, however, should be preferred in undoubted malignancy of the prostate in which methods of infiltration should be avoided.

The two great factors in the production of shock are trauma and hemorrhage and to these, in the great majority of surgical procedures, is added that of the general anesthetic. In the recent more improved methods of general anesthesia this may be practically eliminated as a shock-producing factor, yet it nevertheless has its dangers in the deranged stomach, possible pulmonary and, particularly in prostatectomy, renal complications.

These cases present another danger fully as great as any of the above which I believe is responsible for a large proportion of the mortality in these patients, a danger peculiar to these cases.

Few patients requiring prostatectomy present themselves for operation before they have seriously felt the inconvenience of this condition, many have probably already been initiated into catheter life, some have had one or more attacks of acute retention of urine from prostatic congestion, and practically all will show considerable residual urine and possibly some renal complications; nearly all are disturbed frequently at night by having to arise to urinate. The kidneys have gradually accustomed themselves to this condition and are working against considerable back pressure, and the sudden relief of this pressure at operation completely upsets the renal equilibrium leading to congestion with diminished excretion, or probably anuria. Here lies the particular danger in these cases, and to avoid it we must first relieve

the bladder and permit the kidneys to recover by performing these operations in at least two stages in all cases that show much residual urine or are suffering from retention at the time of operation. The danger, too, of suddenly relieving a distended bladder in these cases cannot be overestimated; vesical hemorrhage may occur, associated with renal suppression. In my observation, this procedure alone has caused as great a mortality as prostatectomy.

In extreme cases such bladders should never be opened at once, unless badly infected and the danger of general infection too great for delay. They should be gradually evacuated by catheter, removing but a portion of the urine at a time at two- or three-hour intervals, or, if almost completely emptied, one-fourth to one-third as much boric acid solution reinjected as there was urine removed. This gradual emptying process should consume from twenty-four to forty-eight hours before the bladder is opened.

Rarely a case is met with in which there is considerable distention and the passage of a catheter too painful, difficult, or even impossible of accomplishment. In such cases, if the suprapubic incision is carried down to the bladder, the bladder can then be emptied by a gradual process of aspiration at intervals of several hours, gradually withdrawing more and more at each successive aspiration, thus overcoming the difficulty. During these intervals the suprapubic wound is kept packed. After twenty-four or forty-eight hours the bladder, which is now fairly collapsed, can be opened with safety.

The method of performing the cystotomy and of dealing with the bladder afterwards is of some consequence. It may be opened with a free incision with the introduction of a tube or catheter to its base and the attachment of some syphoning apparatus, or the escape of urine may be effectively controlled by making a small buttonhole opening into which is passed a Pesser catheter. The incision is then infolded and held by two stitches, one placed on either side of the

catheter. Such a valvelike closure will leak very little, if at all.

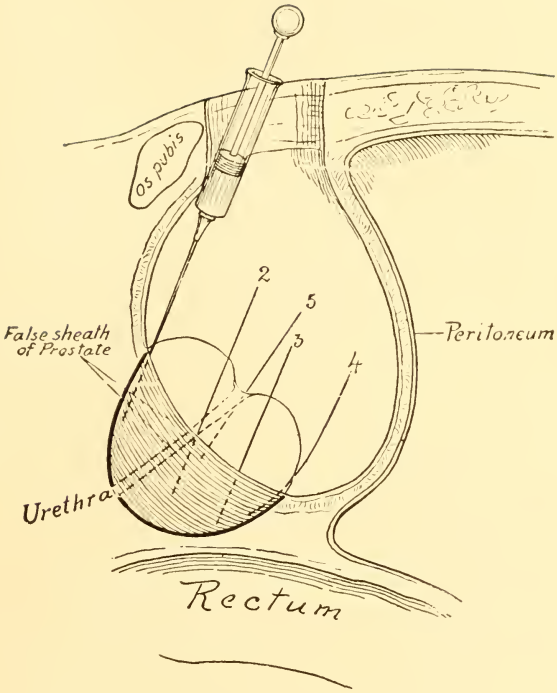
The advantage of this last method is quite apparent, as it permits the collection of all urine and in this way the functional activity of the kidneys can be accurately gauged. It will usually be found that the urinary excretion for the first two days diminishes considerably following the cystotomy, gradually increasing from the third to the fifth day, and is about normal by the end of the first week. By this time, if the patient's general condition is good as shown by normal appetite with good digestion, free bowel movements and after a few nights' normal restful sleep, free from the annoyance of frequent urinations, the removal of the prostate can be undertaken.

If any question exists regarding the condition of the kidneys a further delay is necessary, or their capacity may be tested by phenolsulphonephthalein, and under no conditions should the prostatectomy be attempted until they have reached a fairly normal condition of elimination. By handling patients in this way many bad risks and feeble individuals may be safely carried through the surgical ordeal.

During the interval between the suprapubic cystotomy and the prostatectomy the bladder should be washed once or more daily with warm boracic solution and the suprapubic wound kept lightly packed, and any infection in the cellular planes which may have occurred, which, however, is rare, should be well under control before the final operation is attempted. It is usually noticed that the prostate diminishes decidedly in size following the cystotomy due to the relief of the congestion and this diminution in size facilitates its later removal.

For the suprapubic cystotomy the bladder is first irrigated freely through a catheter with boracic acid solution and left moderately distended.

The injection of the field with the local anesthetic solution is preferably completed before the incision is made, infiltrat-



Author's method for injecting prostate: Lines 1–3 indicate points for injection above and on side of prostate; 4, beneath prostate—this may at times be more conveniently made by a curved needle; 5, enters urethral opening, penetrates urethra, and is made between lobes of gland. While the lines show the axis of the injections with the prostate lying normally in its bed when the injections are made, the prostate is lifted up by a finger in the rectum, so that the needle can be more readily entered in the proper position through the suprapubic opening.

ing the skin and subcutaneous tissues in the middle line for a distance of three or four inches and then passing a long, fine needle down through the skin to the anterior rectal sheath. This sheath is recognized as the first plane of resistance which the needle encounters after the skin is passed. The sheath is gently penetrated, injecting, as the needle is advanced, for about one-half to one inch farther, and the interval between the recti infiltrated. This procedure is repeated at several points along the proposed line of incision. Near the pubis the injection is carried a little deeper into the prevesical space, always injecting as the needle is advanced. If any uncertainty is felt regarding this last deep injection it can be omitted until the recti are separated and the deeper parts brought into view.

After the incision the parts are gently retracted, progressively advancing until the bladder is reached; the cellular tissue over it is divided and pushed up with the peritoneum out of the danger zone. In making this suprapubic incision it is advisable not to approach too closely to the pubis but to keep one or two inches away from this point—the distance depending upon the size of the bladder—and yet the incision must not be too close to the peritoneum. This method has the advantage of avoiding the possible danger of suppuration in this space and facilitates the more rapid closure later of the fistulous opening, for the nearer these openings are to the peritoneal reflection, the quicker seems to be their closure. Those suprapubic fistulæ which have been difficult to close have always been close to the pubes.

The superior bladder-wall is not, as a rule, very sensitive but it should be lightly infiltrated before being incised—one stitch on each side fixes the upper part of the bladder to the posterior rectal sheath; the bladder is then freely irrigated and its cavity explored, determining the size and shape of the intravesical projection of the prostate, removing calculi should they exist, and obtaining any other information which may be necessary. If a direct visual inspection is

desired in cases in which complications are suspected, this can be easily accomplished by evacuating the contents of the bladder and by placing the patient in the Trendelenburg position. Air will enter and dilate the bladder and its interior can thus be freely inspected by gently retracting the incision. Or, if preferred, a short proctoscope with light attached may be passed within the cavity.

If much intravesical examination is necessary or it is desirable to examine the vesical cavity digitally, some form of intravesical anesthesia then becomes necessary. For this purpose I have found it both inadvisable and unnecessary, as well as ineffective, to attempt to anesthetize the interior of the bladder for cystotomy and suprapubic manipulations within it by filling it a short time before with anesthetic solutions. This procedure is now resorted to only for cystoscopy. For all manipulations and operations within it, direct injections are made into, or around, the field to be operated.

The particular sensation with which the bladder is endowed and which is felt upon any abnormal contact with its walls, either internally or externally, is that feeling which we term the desire to urinate. The feeling is more easily excited by manipulation from within and always more acutely toward the vesical neck and prostate region. Pain is only complained of when these manipulations have been rough or when actual trauma has been inflicted. The introduction of a finger within the bladder for purposes of exploration excites a desire to urinate and this desire may become particularly urgent and always becomes so when the parts near the vesical neck are touched. It is not a pain but still may be quite unbearable and demands some effective method to control it. This is accomplished in but a few moments of time. The bladder is first well irrigated and then emptied; with the patient in the Trendelenburg position to dilate the cavity and bring its base into plain view, the anesthetic solution is injected with a long, fine needle at

four or five points around the vesical neck, injecting about one-half dram at each point. The needle is advanced just through the mucous membrane with a quick thrust, injecting the solution as the needle is advanced. Unlike the skin and most other tissues the bladder is tardy in recording its sensations and anesthesia results before any sensation is felt from the punctures. Ordinarily these injections around the vesical neck are sufficient for all intravesical manipulations, which can now be undertaken with the greatest freedom. However, in complicating conditions where the lateral walls are to be operated upon, further infiltration around the field becomes necessary. But as most nerves reach the bladder near its base and around the vesical neck, the injections made here are most effective in controlling its sensation.

If the case is one that does not come within the class requiring a two-stage operation, but the patient is in fairly good physical condition with good kidneys and with but little residual urine and no bladder infection, the prostate may be anesthetized and removed at once.

Whether this be done in a one- or two-stage operation, certain preparatory measures are advisable. One hour before operation a suppository containing 10 gr. of anesthesin is placed in the rectum to anesthetize this region and prevent any discomfort when the finger is introduced here in elevating the prostate; at the same time, one hour before operation, a hypodermic of morphin $\frac{1}{6}$ gr. and scopolamin $\frac{1}{150}$ gr. is administered to lessen psychical disturbances.

If the case is one in which a cystotomy has previously been done, the Pesser catheter or tube is removed from the suprapubic opening. The wound is found presenting a granular surface sloping down toward the vesical opening. This is most effectively and quickly anesthetized by passing a fine needle through this granular surface and injecting just beyond. By beginning these injections above under the skin margin, the needle can be advanced obliquely in several directions, creating a zone of anesthesia just external to this

wall of granulation tissue which will diffuse in all directions, blocking nerve-fibers which come into the field. This is done on both sides and carried down to the vesical opening. Injections are similarly made above and below the limits of the wound in the subcutaneous tissues in the median line, as the wound has probably contracted and will have to be enlarged. The passage of a fine needle through this granulation tissue causes no pain and for that reason is preferred to passing the needle from the skin down. A finger is passed into the bladder to outline its upper limits and determine the proximity of the peritoneal cavity above. Additional injections are now made into the upper wall of the bladder with the finger within guiding the point of the needle.

The bladder opening is enlarged and the patient placed in a moderate Trendelenburg position. After the bladder is well irrigated and emptied, either with a large syringe or sponges, its walls are then retracted by long, deep, narrow retractors, bringing into view the field of the prostate. Depending upon the size and shape of the prostate, several points are selected for injection on the vesical surface, usually one below the opening of the urethra, near the base of the gland, and one on either side. The needle is passed through the mucosa, with the idea of making the injection between the true and false sheath of the prostate, as it is in this plane that the solution must diffuse around the gland, and it is in this plane that its enucleation is effected. It is here where the large venous plexuses are situated and where the nerve-filaments are more easily reached as they pass through to the prostate.

Two or three drams of a ½ per cent. novocaine solution, containing 10 minims of adrenalin to the ounce, are injected at each of the above points. The needle is then passed into the urethral opening and the lateral wall pierced first on one side and then on the other, and similar injections are made at these points. During these injections the finger is kept within the rectum to better guide the passage of the

needle around the prostate where its point can be felt passing between the gland and its false capsule; it also facilitates these injections by elevating or manipulating the gland and guards against the penetration of the false capsule by the needle.

If the gland is very large, or there is much of a projection above the urethral opening, an additional injection can be made here. Otherwise the above will prove sufficient. It is well now to wait two or three minutes for the solution to diffuse and thorough anesthesia to be established before beginning the enucleation. While waiting for the solution to diffuse, the action of the adrenalin is observed in the prostate, which becomes quite pale and bloodless.

In making the injections, should they be made into the substance of the gland itself no harm will be done, only they are not quite as effective as when injected peripherally between the true and false sheath; any excess of the solution thrown into the gland in this way is removed during its enucleation and not absorbed. Following these injections a catheter is passed into the bladder. The enucleation of the gland can now be undertaken by any method preferred by the operator and will be absolutely free from all pain or other discomfort. If the intra-urethral method is chosen the passage of the catheter can be omitted until later, but I have always found its presence a convenient guide to the location of the urethra during the different stages of the operation. A most striking feature is the absence of all bleeding, only a few sponges being slightly soiled, the loss of blood amounting to not more than one or two drams at most. There is no blood to swab out of the bladder afterward.

The catheter which has been left in the urethra is now utilized to draw through the urethra, from the bladder outward, a stout piece of silk which has been doubled and passed through a plug or pad of iodoform gauze arranged somewhat cone-shape and about the size of the cavity left

by the removed gland. The silk thread is long enough to reach beyond the glans penis and when pulled upon draws this plug effectively into the cavity, thus insuring against any possible secondary hemorrhage. The plug in passing into the cavity also has the effect of turning in any free edge or shreds of mucous membrane against the raw surface of the capsule. One end of the pack is left long enough to protrude through the suprapubic opening to facilitate its removal later. This is a most effective and simple method of providing against possible secondary hemorrhage, which is impossible when the pack has been properly placed. As the pack is entirely under your control, it can be forced in tighter by drawing upon the urethral string, or loosened by manipulating the suprapubic end. For this valuable procedure I am indebted to Professor Matas, who taught me its use.

A drainage tube placed in the suprapubic opening and a few approximating sutures complete the operation.

The pack is removed in twenty-four or forty-eight hours when danger of hemorrhage is past and the case is handled by the usual methods following these operations.

A notable feature is the absence of all shock or depression, the pulse showing very little change after operation. Often there is not enough pain to justify a hypodermic. These cases are usually up in a chair in a few days and on their feet by the end of a week. The nourishment is usually restricted to liquids for the first day, after which they are permitted to eat what their appetite calls for. Many cases operated by this method show absolutely no after-disturbance of any kind and feel as if they had not been operated at all.

DISCUSSIONS ON THE PAPERS OF DRS. JUDD AND ALLEN

Dr. Francis R. Hagner, Washington, D. C.—Dr. Judd's paper is especially interesting, although it is a difficult paper to discuss, as it covers such a large field.

The only hope we have for these cases is early diagnosis and those who do genito-urinary surgery do not see most of these cases until it is too late to do more than some palliative operation. Some patients with cancer of the prostate do not consult the surgeon, until they cannot stand their discomfort any longer. This is the reason the results are no better.

There are two distinct kinds of malignant disease of the prostate, one in which there has been hypertrophy with malignant disease engrafted on it, and the other in which the trouble begins as a malignant condition. In those cases of malignant disease engrafted on the hypertrophied prostate we get results from the removal of the prostate. In the cases that begin as a malignant growth the prostates are small, and in these we get bad results from ordinary prostatectomy. I believe in this class of cases it is perfectly useless to do prostatectomy except with the idea of allowing the patient to pass urine for a few months. The only thing that gives the patient a chance is to have a radical operation done, such as Young has advocated, namely, the removal of the neck of the bladder and adjacent parts. In the group of cases Dr. Judd has told us about, the results in a few of them were good, but in others the patients did not live much over a year. I am perfectly willing to grant that some of these patients are made more comfortable by the operation, which does no good from a curative point; and yet none of us have any better record. Occasionally we all have cases that are not recognized; fairly large prostates are removed, and when we study them carefully we find they have areas of malignancy. These patients live sometimes for five or six years without a recurrence, but they are the ones we stumble on accidentally.

Dr. Allen's method of removing the prostate under local anesthesia is I think the same as that employed by Lower, of Cleveland, Ohio, and it is a good method of doing it. Personally, I have used it in only a few cases. Under nitrous oxide and infiltration of the skin I have removed the prostate in a number of cases, and it has done very well. This method of anesthesia is quicker, and I believe in some cases where we take time to inject cocain and carry on manipulations, the patients are subjected to a certain amount of shock, and in such cases it is better to give nitrous oxide and oxygen and remove the prostate as rapidly as possible.

Dr. Bransford Lewis, St. Louis, Missouri.—I want to speak of one or two points. There is quite a difference of

opinion as to the desirability of operating in cases of carcinoma of the prostate. I was very glad to hear the point made by Dr. Judd with reference to a radical operation. I myself have never been convinced that a radical operation held a very desirable position, for two reasons, one of which was mentioned by Dr. Judd, namely, that you leave the patient in a very deplorable condition because of his lack of control over urination, and he would just as soon have cancer as to have no control over urination.

Another point is this: In a number of cases you get remarkably good results from the conservative and less radical methods of operating on the prostate, clearing out all you can and obtaining a good passage for the urine. I have been surprised myself at the results. I have gotten much better results than I promised the patient or ever expected. These patients had their ability to urinate restored and were also able to hold urine.

The paper of Dr. Allen on the subject of local anesthesia was interesting to me, and he shows the great importance of making prostatectomy feasible even in the most unpromising cases, the subject of general debility, advanced age, and so on. Prostatectomy is seldom impossible because of old age or debility, because preparatory treatment has been so perfected as to bring it within the reach of all.

I remember one case that required nine months of preliminary treatment before I got the man in a condition where I thought it would be permissible to operate. He was brought to that condition; he was operated on then and is well today. He was out of his head for two months with uremia; he had heart lesions and others which we cannot stop to mention. But the one thing that permitted the restoration was not mentioned by Dr. Allen, and that is the self-retaining catheter. If he did mention it, then I beg his pardon. I believe that one of the most valuable procedures in connection with preliminary treatment is the use of the retained catheter. You can insert it in a few minutes and keep it in for six months. In this patient I have referred to, I kept it in for nine months. There is no doubt that it greatly assisted in restoring him to an operable condition, when we took out his prostate and he went through the operation successfully. The patient was seventy-eight years of age.

With regard to local anesthesia, it is conceded by all that suprapubic cystotomy is easy under local anesthesia, but I

have yet to be convinced that it is easy or advisable to use it without other anesthesia for the removal of the prostate.

Dr. Hagner's suggestion is a good one, namely, that shock from manipulation in a patient who is weak would be almost comparable to the shock that is supposed to come from ether anesthesia or a small amount of nitrous oxide. Patients often get through with ether anesthesia in better condition than they started; so that with reference to that one feature I am yet to be convinced. You see, I am from Missouri.

Dr. W. R. Jackson, Mobile, Alabama.—I would like to ask Dr. Judd what percentage of non-operative cases (malignant) show metastases? I would also like to have him give us concisely the technique of the removal.

Dr. Judd (closing on his part).—I want to thank Dr. Hagner and Dr. Lewis for discussing my paper.

In reply to Dr. Jackson: The cases that had any evidence of metastatic involvement were not operated on. I do not know what percentage of the non-operative cases show metastases. I do not think it is a large per cent. There were one or two cases of involvement of the inguinal glands, and one or two cases of abdominal metastases.

Dr. Allen (closing the discussion).—I am glad some points were brought out, because until I got to doing prostatectomy with local anesthesia I thought it was a hard thing to do. It is harder to do a suprapubic cystotomy with local anesthesia than it is to perform prostatectomy. The removal of the prostate is easy if you get the needle in the right place. The loss of time is trifling and no shock. I do not disturb them any more than when I do a hernia operation. There is absolutely no shock attending the operation. I give scopolamin if the patient is nervous. We allow two or three minutes for the solution to diffuse itself. It does not take many minutes to anesthestize the prostate. I am confident of that because I have often timed it. One advantage of this method is that you may want to inject adrenalin anyway to control hemorrhage and save the patient that much blood, and when you inject the adrenalin you can just as well add novocain.

As to the use of the catheter mentioned by Dr. Lewis, it is a detail the importance of which we all recognize. Those details I have discussed in my paper.

THE RADIUM TREATMENT OF FIBROID TUMORS

By Howard A. Kelly
Baltimore, Md.

I HEREWITH present a series of thirty-six cases of fibroid tumors of the uterus treated by radium during the period covered from March 18, 1913, up to October, 1914. I have excluded from this plan of treatment only cases presenting some serious complication, such as pelvic inflammation, ovarian growths, or obstructive symptoms. This list refers also only to patients treated in a private hospital in Baltimore.

The method of treatment employed has been a dilatation of the cervix and the introduction within the uterine cavity of amounts of radium varying from 30 to 724 mg. In some of the larger tumors an additional massive treatment has been given through the abdominal walls. I omit one case, included in a former list, in which the treatment was applied within the cervix and not within the uterine cavity. In this case the symptoms of excessive flow continued, and I operated upon the patient, doing a supravaginal amputation. The effort has been made in each case to treat the uterus and the tumor, avoiding, as far as possible, treating the ovaries unless the patient was near the menopause or past it. Gamma-ray therapy is applied, the radium being screened by platinum or platinum and glass, further enclosed in a rubber tube. In giving massive abdominal treatments, the radium is further enveloped in cotton and gauze in order to give distance to the treatment.

The patients have varied in age from thirty to sixty-seven years, the average being forty-two and a half years. Divided into three groups, eleven were between thirty and forty, twenty-one between forty and fifty, and four over fifty.

The tumors have varied in size from small ones about 5 cm. in diameter up to massive growths extending close to or well above the umbilicus. The large tumors were more or less spherical.

The indication for treatment, in a surprising number of cases, was hemorrhage, either menstrual or both menstrual and intermenstrual. Occasionally the complaint was dysmenorrhea and pain, or simply pain in the lower abdomen, or again the patient came because she recognized that she had a growing tumor.

Tumors of all kinds have been treated, and the submucous and subperitoneal, and even the pedunculate, have seemed to respond as well as the interstitial. All the patients are under observation, being written to or examined with the aid of the family physician, or seen and examined personally.

The results in every case but one have been either the shrinkage of the tumor or even its complete disappearance. This latter happy terminus has not seemed to depend on the size of the growth, as, for instance, one in the list reached three finger-breadths above the umbilicus, one just below the umbilicus, and another was 15 cm. in diameter. The desired results were secured in periods varying from two months to a year or a year and a half. In some of the cases still under observation, some months after treatment, the shrinkage still continues to go on. One of the most striking effects is upon the menstrual function, where the radium can in all cases be depended upon to bring about complete amenorrhea. In the one case in the list which has recently been operated upon, although the tumor did not shrink in size, complete amenorrhea was secured. If care is taken to avoid giving too large a treatment, it is possible in some cases, especially with young women, to avoid amenorrhea

(four instances in list). With this object in view, a large treatment is given over a short period of time.

The amount of radium used has varied considerably, as we have been busy working out just the proper dosage. As an ideal dosage we would suggest ½ gram of radium element for two hours. We are at present working diligently, attempting to establish some other gauge of treatment than the radium hours; that is to say, estimating that 100 mg. inserted for four hours is to be called a 400 mg. hour treatment equal to a dosage of say 25 mg. for sixteen hours, which also makes a total of four hundred hours. The physiological and pathological effects are by no means the same. The present obvious factors are: the size of the tumor, the position of the ovaries, the amount of radium used, the distance of the radium from the tumor and the ovaries, and the time over which the treatment is continued. There are other factors, but these are the chief ones which enter into every case.

The sensitiveness of the tumors to radiation varies extremely, some of them responding almost like round-celled sarcomata, shrivelling away rapidly. As yet no real dangers have developed in connection with the treatment and with the methods more recently in use, viz., that of a big dosage and a short exposure. The discomforts are very slight or none at all, while on the other hand, with a small dosage and long exposure, abdominal discomforts were sometimes produced which lasted for several weeks, with a leucorrhea more or less persistent. In about 50 per cent. of the cases where amenorrhea has been produced, there have been no hot flushings or nervous symptoms, although these menopausal sequelæ have been marked in some cases.

The best answer to the question regarding the liability of overlooking malignancy, in some of these radium-treated fibroids, can be taken from Kroenig's and Gauss' statistics of several hundred fibroid tumor cases treated with *x*-ray, where not one developed any malignant disease subsequently.

The radium treatment is ideally adapted to anemic and weak patients.

I fully realize that in presenting so short a series the results are suggestive rather than conclusive, and that further experience is necessary before we can speak with confidence as to the outcome in any given case. I suggest, therefore, the following tentative conclusions:

Massive radium treatment of uncomplicated fibroid tumors is the best plan, as it stops the excessive flow; sometimes in younger women it regulates it without stopping it. Radium reduces the tumors in almost every instance, relieves pressure symptoms, and even causes large tumors to disappear.

A fibroid tumor is not a malignant growth, therefore any method of treatment which will give entire relief to the symptoms is the best method, provided it will at the same time avoid the various risks of an operation. If radium is tried and fails, the operation can then be undertaken without any added risk. Touching this last point, I must add that while a recent radium treatment often makes more difficult the subsequent radical extirpation of a cancer of the cervix, there is no reason to expect this result in fibroid tumors.

It is our belief that, with increased experience and improved technique, it will be possible to relieve every patient of hemorrhages and in most instances to do away with the tumor (let us say, roughly speaking, in 9 cases out of 10), and that without serious discomfort or confinement to the bed for more than one or two days. Patients too anemic and weak even for an intra-uterine application of radium can be treated through the abdomen exclusively.

Initials.	Date of treatment.	Age.	Symptoms.	Size tumor.	Treatment. Radium element.	Results.
E. R. W., San. 4572	Mar. 18, 1913	45	Hemorrhages	Small fibroid	30 mg. 48 hours	Tumor disappeared, cessation menses.
E. G. E., 55	Mar. 23, 1913	35	Menorrhagia	Size of fist	3 in all 30 mg. 48 hours	Growth one-third size, cessation menses.
M. K., 119	May 27, 1913	46	Menorrhagia	Three months pregnant	50 mg. 24 hours	Complete disappearance of tumor, menstruation continues regular.
F. D. P., 175	May 17, 1913	44	Menorrhagia and dysmenorrhea	15 cm., spherical	70 mg. 24 hours	Amenorrhea, uterus normal.
A. A. W., 274	July 7, 1913	51	"Bleeding and tumor"	22 cm. across and with cyst 20 cm.	60 mg. 47 hours	Amenorrhea, tumor reduced to one-half, ovarian tumor disappeared.
M. B., 281	Aug. 25, 1913	33	Profuse menstruation	Tumor filling pelvis three fingers above umbilicus	120 mg. 18 hours	Amenorrhea, complete disappearance of tumor.
E. B., 324	Oct. 4, 1913	43	Excessive bleeding	Uterus twice normal; one tumor felt	80 mg. 24 hours	Amenorrhea, uterus normal, tumor gone.
M. M., 332	Oct. 7, 1913	40	Bleeding tumor; exophthalmos	Up to umbilicus	Abdominal; 734 mg. 6 hours, 484 mg. 4 hours	Amenorrhea, general improvement, great reduction in size of tumor.
C. N. B., 333	Oct. 7, 1913	43	Excessive menstruation	Half way to umbilicus, 15 cm. in diameter	60 mg. 24 hours; 300 mg. 20 hours; abdominal	Amenorrhea, tumor reduced to 2.5 cm. pedunculate.
C. E. D., 334	Oct. 20, 1913	40	"Tumor"	Filling pelvis up to umbilicus	100 mg. 26 hours; 60 mg. 11 hours; abdominal	Amenorrhea, tumor size of orange.
H. W. T., 370	Nov. 6, 1913	59	Irregular hemorrhage and tumor	Four months pregnant	10 mg. 24 hours	Cessation of bleeding, reduction of size of tumor.
W. T. D., 375	Dec. 10, 1913	33	Menstrual bleeding	Filling pelvis and abdomen above umbilicus	60 mg. 18½ hours	Amenorrhea, tumor half size.
A. McG., 394	Nov. 18, 1913	46	Bleeding	Three months pregnant	60 mg. 17½ hours; 60 mg. 2 hours	Amenorrhea, reduced to half size.
A. H. McF., 614	Feb. 6, 1914	46	Hemorrhages	Uterus twice normal; a fibroid 4 cm. in diameter	170 mg. 13 hours	Amenorrhea, normal size.
A. F. F., 637	Feb. 22, 1914	40	Excessive hemorrhages	Three months pregnant	170 mg. 10 hours	Amenorrhea, tumor disappeared.
B. S., 681	Mar. 16, 1914	39	Tumor	Just below umbilicus	544 mg. 1½ hours abdominal; 1371 mg. 2½ hours	Complete disappearance of tumor, menstruation normal.
L. H. C., 771	Apr. 20, 1914	44	Excessive flow; tumor	Five months pregnant	724 mg. 1½ hours	Amenorrhea, reduced to half size and still going down.

M. L. C., 792	Apr. 25, 1914	49	Tumor, past menopause	15 cm. diameter	275 mg. 6 hours	Reduced to 8 cm.
A. L., 825	Apr. 30, 1914	38	Excessive flow; dysmenorrhea	Six weeks pregnant	560 mg. 3 hours	Amenorrhea, disappearance of tumor.
A. H., 931	June 14, 1914	45	Bleeding	Two months pregnant	380 mg. 4 hours	Amenorrhea, reduction of tumor.
A. W., 932	June 23, 1914	67	Tumor	Filling pelvis and lower abdomen, 10 cm. across	300 mg. 2½ hours	Reduced to half size.
D. G., 933	June 22, 1914	46	Tumor	Four months pregnant	544 mg. 6 hours	Amenorrhea, marked reduction in tumor.
J. H. B., 940	June 26, 1914	40	"Terrible bleeding"	4 cm. above pelvis	300 mg. 3 hours	Complete amenorrhea and disappearance of tumor.
F. E. B., 969	July 3, 1914	45	Tumor and abdominal pain	Filling pelvis up to umbilicus	544 mg. 4½ hours; 1911 mg. 8 hours; abdominal	Amenorrhea, tumor size of orange, wholly intrapelvic.
G. B. B., 991	July 20, 1914	44	Tumor and dysmenorrhea	8 cm. above pubis	400 mg. 4 hours	Amenorrhea, great reduction in tumor.
E. P. M., 964	July 2, 1914	42	Tumor and pain	10 cm.	544 mg. 3½ hours	Amenorrhea, reduced to 5 cm. diameter.
E. I. K., 978	July 11, 1914	37	Excessive painful menstruation	Twice normal; tumor big as hen's egg	544 mg. 3½ hours	Amenorrhea, tumor half diameter.
E. S. T., 994	July 18, 1914	38	Bleeding and tumor	Just below umbilicus filling pelvis	544 mg. 4½ hours; 1911 mg. 4 hours; abdominal	Menstruation normal, tumor one-quarter original size.
T. J. H., 1003	July 28, 1914	38	"Fibroid tumor"	15 cm. diameter	510 mg. 4 hours	Amenorrhea, reduced to half, still going down.
G. D. B., 1059	Aug. 9, 1914	30	Abdominal pain; tumor; bleeding	Filling pelvis and lower abdomen to umbilicus	300 mg. 6 hours	Tumor intrapelvic, menstruation regular and scant.
I. S. Mc., 1072	Aug. 21, 1914	38	Tumor	Entire pelvis, abdomen to two fingers above umbilicus	510 mg. 3 hours; 1911 mg. 15 hours; abdominal	Menstruation persists, greatly reduced intrapelvic.
J. S. B., 1121	Sept. 9, 1914	43	Tumor	Within 3 cm. umbilicus, 9 cm. across	540 mg. 4 hours; 1911 mg. 2 hours; abdominal	Reduced in size to 8 x 9 cm.
M. E. T., 1150	Sept. 23, 1914	38	Tumor; hemorrhage	9 cm. in diameter, fills pelvis half-way to umbilicus	647 mg. 4 hours and 3 minutes	Menstruation regular, tumor two-thirds original size.
M. M., 1160	Oct. 5, 1914	43	Tumor; hemorrhage	Filling pelvis to umbilicus	400 mg. 4 hours	No bleeding, tumor intrapelvic, about 8 cm. in diameter.
M. S., 1207	July 30, 1914	45	Excessive bleeding and tumor	Three and a half months pregnant	714 mg. 4 hours	Amenorrhea, uterus normal in size.
M. C., 1022	Aug. 2, 1914	36	Aortic regurgitation; tumor; excessive bleeding	Tumor above umbilicus	510 mg. 5 hours; 1911 mg. 7 hours; abdominal	Menstruation stopped, tumor unchanged, operation.

A CASE OF SOLID FIBROID TUMOR OF THE OVARY

By Joseph Taber Johnson, M.D.
Washington, D. C.

Mrs. F., white, aged sixty-seven years, mother of several children, had been troubled with pelvic pains for several years. About a year ago the bowels became so obstructed as to require strong purgatives and enemata to secure an evacuation. She rapidly lost flesh and strength and the six months previous to the time I saw her she was compelled to remain in or upon the bed, partly because of weakness and partly on account of the increased pain from pressure upon the bladder and rectum induced by the erect position.

She had eaten no solid food for seven or eight months, hoping to thereby lessen the pains of indigestion and especially the constantly increasing agony of defecation. She was a great sufferer from flatulency and wind colic.

She was permitted to acquire the opium habit to allay her pains. Her condition appeared to many to be hopeless, and the old lady was wishing and praying that she might soon die and thus end her misery.

Dr. Pyles made a rectal examination in June last, and discovered a hard tumor filling the pelvic cavity and thought it might possibly be removed. Dr. Bayne saw the case with him soon after, and opposed an operation, firstly, on the ground of its apparent malignancy and, secondly, because he did not think she was strong enough to survive the ordeal.

The patient some weeks later demanded that something be done to relieve her, and declared not only her willingness

but anxiety to run any risk which presented a ghost of a chance of success.

I was invited by Dr. Pyles to see her early in December, 1901, and made a diagnosis of impacted and adherent uterine fibroid. In view of all the circumstances named it appeared to be a most unpromising case, but as the patient was certain to die as she was, and was pleading for an operation, I agreed to do what I could toward ridding her of her burden, making no promises whatever, only telling her there was a very slim chance that she might survive.

She was brought to my hospital in an ambulance on December 19, carried in on a stretcher, and operated on the same week. I feared if the operation proved difficult or long that she would die in collapse on the table and began the incision in the most exaggerated Trendelenburg position, indeed, she was nearly standing on her head.

The tumor, much to my surprise, proved to be a solid fibroid of the right ovary and practically free from adhesions only imprisoned below the brim of the pelvis. It was easily and quickly removed. The entire operation lasting less than twenty minutes.

The lady has made a good recovery, is eating a generous mixed diet, and is nearly free from the morphia habit also.

She walked out to her carriage and went home on January 31.

This is the first perfectly solid tumor of the ovary I have ever seen in about 4000 of my own abdominal sections and nearly another 1000 performed by other surgeons in this and other countries. I regret that no microscopical examination was made. The tumor was cut open after removal and found to be absolutely solid, white inside and weighed four pounds and was recorded as a fibroid tumor of the right ovary. Goodell and a few other writers mention them as occurring once in about 1000 cases.

A partial examination of recent gynecological text-books reveals an experience similar to my own in regard to this

rarity of solid tumors of the ovary; also that they are more unilateral; that they occur in the young and aged much more frequently than in middle life; that their growth is slow, that they are more subject to malignant and other forms of degeneration than are fibroid tumors of the uterus; that the chief symptoms are pain from pressure and ascites; that they are to be differentiated chiefly from small uterine fibroids with elongated pedicles and degenerated solid pelvic tumors with ascites.

Peterson in July, 1902, in the most elaborate paper I have seen on this subject, collected 84 cases of solid tumors of the ovary. His researches led him to believe that these tumors were not so rare as had been formerly taught, and that they occasionally attained great size.

Kelly and Noble state they occur in 2 per cent. of ovarian tumors. These tumors should be removed as a whole on account of the danger of infection from malignant degeneration.

DISCUSSION ON THE PAPERS OF DRS. KELLY AND JOHNSON.

Dr. Thomas S. Cullen, Baltimore.—I was much interested in Dr. Johnson's paper and also in the work of Dr. Peterson. I think the 2 per cent. of solid tumors of the ovary referred to in the Kelly-Noble book is an index of the percentage we have had in the gynecological department of the Johns Hopkins Hospital. We have had quite a number of cases of fibroma of the ovary. Then we have had other cases which, on histological examination, were somewhat doubtful. In some of these cases it was almost impossible to tell accurately whether they were fibromata or sarcomata. We have also had a few cases of sarcoma of the ovary.

Several years ago I operated upon a most unusual ovarian tumor. It was reported in detail by my brother in the *Johns Hopkins Hospital Bulletin*. In that case the solid tumor was attached to the posterior surface of the bladder and it had also become adherent in the pelvis. As this tumor grew it drew

the bladder upward, consequently the bladder was a long and flattened sac. It could not contract and the patient had to be catheterized several times daily.

On histological examination the tumor was found to consist of two elements. The matrix of the tumor consisted of the most typical spindle-cell sarcoma one could find. Scattered here and there throughout the growth were area of adenocarcinoma.

The patient referred to lived for several months. My brother was so interested in the condition found that he went to Hagerstown to perform the autopsy. In the pelvis he found a local return of the growth and scattered throughout the omentum were secondary nodules. The local growth was sarcomatous, the nodules in the omentum typical adenocarcinoma. Thus nature in her secondary growths had separated the two malignant processes which were combined in the primary tumor.

In a certain percentage of the cases ascites was associated with the ovarian fibroma. The cause of the ascites in these cases came up, as Dr. Peterson will remember, two or three years ago at a meeting of the American Gynecological Society. I feel sure that the ascites in a certain percentage of the cases at least is due to the dead weight of the tumor. Where we have a multilocular cyst there is a certain elasticity, but where we have a solid tumor there is a dead weight.

I was greatly interested in this subject when studying parasitic myomata—myomata that receive the greater part of their nourishment not from the uterus but from some other structure. In an examination of a rather large group of cases I found that as a subperitoneal myoma became more and more pedunculated that the omentum grew fast to the tumor and that it sent vessels into the growth. As the myoma became more and more weaned away from the uterus the omental vessels going to the tumor grew larger and the fat of the omentum in some cases would disappear almost entirely. In such cases the myoma was then very mobile allowing torsion of the omental vessels. In these cases there was usually more or less free ascitic fluid in the abdomen. In one case where the pedunculated myoma was almost the size of a four months' pregnancy I found 51 liters of ascitic fluid.

I attribute the accumulation of the fluid to the partial torsion of the omental vessels. If correct in my assumption, then with removal of the myoma or the fibroma of the ovary, as the case may be, no further accumulation of ascitic fluid should occur,

and in no case apart from those where a cardiac or renal lesion existed have we noted any ascitic fluid after operation. Ascitic fluid associated with myomata has been considered in full in Kelly and Cullen on *Myomata of the Uterus.*

I would like to ask Dr. Kelly what results he gets with radium in hyperplasia of the endometrium. In this group of cases we find a markedly thickened endometrium, large and small glands with a marked thickening of the epithelium and a very cellular stroma, often containing nuclear figures.

These patients have an exceedingly long and profuse menstrual period but no intermenstrual discharge. The condition is usually noted during the child-bearing period, but I have seen it on several occasions in girls fourteen or sixteen years old.

Curettage relieves the condition for a few months and then excessive periods often recur. Some patients have to be curetted three or four times before permanently relieved. In a few cases it has been necessary to remove the uterus.

I would also like to know Dr. Kelly's results with radium in cases of adenomyoma of the uterus.

Dr. Henry O. Marcy, Boston.—I have seen but one case of solid tumors of the ovary. These were symmetrical, and weighed 3½ pounds each, six inches in diameter, rather flat in shape, and entirely free from adhesions. They were removed easily. There was no ascites. The patient recovered and remained well.

Dr. Reuben Peterson, Ann Arbor, Michigan.—I will confine my discussion to the first paper since I have had no experience with the treatment of fibroid tumors of the uterus with radium.

The subject of fibroid tumors of the ovary interests me exceedingly, possibly because it has been my good fortune to have so many of these cases, some fifteen in all. This seems strange when a man of Dr. Marcy's large experience has only seen one tumor of this variety.

For the purpose of this discussion I went over my records at the University Hospital and found I had eleven fibroid tumors of the ovary in approximately 6000 gynecological cases. I have also had four or five such tumors in my private practice, but for lack of time I was unable to include the latter in the following résumé.

The ages of the eleven patients with solid fibroid tumors of the ovary varied from fifteen to seventy-one years, four of the

patients being before and seven after menopause. There was ascites present in eight out of the eleven cases or in seventy-two per cent. This is above the average, since, as I have shown in my collection of eighty-four cases of fibroid of the ovary collected from various sources, ascites is present in about forty per cent. of the cases. Five of the eleven tumors showed degenerative changes such as liquefaction necrosis or calcification. There were twists of the pedicle in three cases, showing that twisting of the pedicle because of the nature of the latter is much more common than is the case with fibroids of the uterus. In three cases the ovarian fibroids were associated with uterine fibroids and with ovarian cystomata in the same number of cases. All patients recovered from the primary operations and there have been no recurrences, showing that the microscopic diagnoses were probably correct.

Ovarian fibromata differ from uterine fibromata in that they are found early in life. I have seen three of these tumors in patients between fifteen and twenty years old. Curiously enough, ovarian fibromata also occur quite frequently late in life, six per cent. of the tumors being in women between sixty and seventy, while only one per cent. of uterine fibromata occur between these ages.

Both ovaries were affected in seven per cent. of the cases. The weight of ovarian fibromata varies from one to twenty pounds. The tumors are of slow growth as a rule, but in rare instances the reverse is the case and they may become very large tumors in a few months. One-half of the patients having ovarian fibromata complained of abdominal pain and in most of these the tumors were of moderate size. The pain in connection with these growths is usually explained by adhesions or a wedging of the tumors in the pelvis.

Of especial interest in connection with ovarian fibromata is the ascites present in about fifty per cent. of the cases. Unless it be borne in mind that a pelvic tumor with ascites may be an ovarian fibroid, the case may be judged malignant and the proper treatment not instituted. One of my patients with ovarian fibroid had been tapped sixty-four times under the supposition that she was suffering from malignant ascites. Complete recovery followed the removal of the ovarian growth.

The explanation of the presence of the ascites is not as easy as Dr. Cullen would lead us to think by his remarks. The ascites cannot be due to a dragging or weight in the abdomen

since the ascites are associated not with the largest but the smallest growths. Nor can initiation of the peritoneum be a cause of the ascites since the fluid as a rule is clear and the peritoneum free from signs of inflammation.

It is not always easy to make a diagnosis of ovarian fibroma. When the growth is large it may be impossible to separate the uterus from it. Especially difficult may it be at times to differentiate an ovarian from a uterine fibroid. Both may have pedicles and both may originate from the sides of the uterus. The diagnosis is much easier when the pedicle is made out connected from the anterior or posterior uterine wall, in which case it can be nothing else than a uterine fibroma.

Dr. R. S. Hill, Montgomery, Alabama.—I do not care to refer to the main subject under discussion. I simply wish to say I cannot see any good reason for the removal of the healthy testicle by Dr. Kelly. He tells us that both of the testicles were undescended; that one of them had become diseased and attained an immense size; that the use of radium caused the diseased organ to shrink and become a mere nodule; that while he felt reasonably sure the disease had been destroyed by the radium, yet for fear of a possibility of a relapse it was decided best to remove the nodule. I am sure that this was the safest and best course to pursue, notwithstanding the effect of the radium on the diseased organ was nothing short of marvelous and should inspire us with confidence in its curative powers.

We are told that in removing the remains of the diseased organ it was discovered that the other testicle was in the abdomen and though it was not diseased, yet, for fear it might become so, it was thought best to remove it. In view of the fact that of some 15 or 20 cases of undescended testicles that have been, with one exception, successfully operated on by my brother, Dr. L. L. Hill, and myself, I am decidedly of the opinion that an effort should have been made to bring this healthy organ out of the abdomen. If it could not have been brought further than simply through the external ring, it would have been in a position where it could have been easily observed, and subject to prompt attack on the slightest show of trouble. In the face of the marvelous result from the use of radium in the treatment of the diseased organ in this boy and the success I have seen in placing undescended testicles in the scrotum, I insist that an effort should have been made to bring this organ out of the abdomen and preserve it, even though by so doing a risk of its becoming diseased would have been entailed.

Dr. Herman J. Boldt, New York City.—I wish to make one remark with reference to the explanation of ascites in connection with fibroid tumors of the ovary, and the reason why I believe it occurred more frequently in small-sized tumors. I have always ascribed it to local irritation of the peritoneum from the pedunculated tumor, the same as we sometimes get ascites in cases of subperitoneal myomata when they have a long pedicle. That is the only way to explain it.

In regard to the point Dr. Johnson brought out of malignant degeneration of fibroids of the ovary, that condition would probably be found if we had an opportunity to examine the patient. They were originally malignant, and the probabilities are that it was not a secondary malignant degeneration.

Dr. Joseph Ransohoff, Cincinnati, Ohio.—I have had one case of fibroid tumor of the uterus, and I was called to see another one. When I went to the operating room with one of my colleagues it was thought that we had a solid fibroid of the ovary. Operation, however, revealed a thrombosed spleen, the only case I have ever seen in the pelvis which simulated an ovary.

I was very glad indeed to hear the excellent results reported by Dr. Kelly with the use of radium. I thought I detected a little sarcasm in the remarks of one of the preceding speakers (Dr. Hill) in regard to the removal of the healthy testicle.

Dr. Hill.—I disclaim any intention of being sarcastic at all. My remarks had reference particularly to the removal of the healthy testicle in view of the fact that such brilliant results were obtained from the use of radium in the diseased testicle.

Dr. Ransohoff.—I am glad to know that the doctor's remarks were not given in a spirit of sarcasm. I am a little bit of an extremist myself on the subject of radium. It does not require a Rockefeller or a Kelly to get enough radium with which to treat cases. With 100 milligrams of radium one could do almost anything that is necessary.

Some of the most gratifying results we have had—they have not been many—have been in small fibroid tumors of the uterus, not more than two or three inches long. Formerly, in removing these growths the uterus was taken away with them. If you split open the uterus after its removal you see one or two intramural fibroids, one may be in the mucosa, and in looking at the uterus after its removal you feel ashamed to think you removed an organ of that kind in a young woman. Uteri

of that type can be successfully treated by the use of radium, so that all symptoms will disappear. There can be no question in my mind that if radium does that, if you can save the uterus for a young woman at the risk of inducing a premature menopause, an enormous thing has been gained. That is one thing in favor of radium.

With regard to sarcoma, I have seen a few inoperable cases of sarcoma in which the results have been simply astonishing from the use of radium.

Last May, before going abroad, there was referred to me a man with a large sarcoma which could be felt through the rectum. There could be felt a dragging above the brim of the pelvis. The origin of that sarcoma could not be determined before operation, nor was it determined after operation. An exploratory operation was done and an exceedingly vascular tumor found. That tumor was excochleated, so that nothing was left but a shell and into the shell there was put radium, which was left for forty-eight hours, and later reapplied. I thought this man would die. I left for my trip abroad a day or two afterward. On my return I found the wound had healed entirely. There was not a vestige of the growth, and it is now six months since that treatment was first instituted. I can feel through the anterior wall nothing but the scar of the incision. Evidently, we have achieved a clinical cure in this case that could not have been obtained in any other way. So much for radium.

Dr. Thomas S. Cullen, Baltimore.—May I ask Dr. Peterson a question? If the ascitic fluid be due to irritation should we not find some evidence of this irritation. The fibroma as a rule is free from adhesions. On histological examination there is as a rule little or no evidence of any hyperemia, nor are small round cells or polymorphonuclear leukocytes found at or near the surface of the growth. In other words the specimen gives no tangible evidence of irritation.

Dr. W. P. Carr, Washington, S. C.—I would like to call attention to the fact that the testicle Dr. Kelly removed was of no functional value whatever, at the time of its removal, if it ever was.

I sent a patient to Dr. Kelly three years ago with one of the most inoperable cancers I ever saw. After treatment with radium, today she is perfectly well apparently.

Dr. William Carpenter MacCarty, Rochester, Minnesota. —May I ask Dr. Kelly how he protects the ovaries in these cases while using radium?

Dr. Henry T. Byford, Chicago.—This discussion is of value in bringing out the fact that fibrous tumors of the ovary are not as rare as we have previously supposed. I can recall four or five such cases in my own experience.

With regard to the diagnosis, there is one point which helps differentiate them from small pedunculated uterine fibroids. The pedunculated tumor of the uterus nearly always has a short pedicle, and can be moved but a short distance before it drags upon the uterus. Fibrous ovarian tumors, although they have short pedicles, are movable over a greater area without dragging upon the uterus, and the uterus can be moved without disturbing them very much.

Dr. W. R. Jackson, Mobile, Alabama.—In connection with the use of radium in persistent amenorrhea, I would like to ask Dr. Kelly if its effect is due to destruction of the uterus and endometrium, or to the atrophic condition of the ovary?

Dr. Johnson (closing the discussion on his part).—I read this short paper for the purpose of reporting what seems to be a rare case and as everybody has agreed with me, it leaves nothing for me to say in reply, so I will give my four minutes to Dr. Kelly who will doubtless have considerable to say.

Dr. Kelly (closing the discussion).—How will radium affect an adenomyoma? I have been thinking about that of late, but I learned a lesson in 1886 when I joined the American Gynecological Society and Apostoli was present; he advocated elaborately the treatment of extra-uterine pregnancy by electricity. But when some one asked him how many cases he had had he replied, "he had never seen a case!" I do not know how radium will act in a case of adenomyoma. It does stop hemorrhages in all hemorrhagic uteri, whether arising from disease of the mucosa, from disease of the uterine walls, or from diseased ovaries.

In reply to the question, how are the ovaries protected, I would say they are protected by a heavy sheet of lead. You cannot protect them absolutely, but by isolation in this way, applying treatment more directly over the fibroid tumor, you get at the mass of the tumor more readily, and there concentrate your maximum dose while sparing the ovaries to the utmost.

Touching persistent amenorrhea, a patient may have amenorrhea for several months, and then a normal menstruation may come back.

We treat fibroid tumors by a method exactly the opposite

to the method pursued abroad, where the dogma prevails that the ovaries control the growth of the tumor and menstruation, and therefore must be treated. On the contrary, we treat the tumor and leave the ovaries out. I am very emphatic about this.

In young women we can sometimes conserve the ovarian function. Radium acts better at a distance.

As for supplies of radium, it is a therapeutic agent we are obliged to have, and it is the fault of Congress and of our legislators that radium is not within the reach of every practitioner. I went to Washington, I worked with the Mines Bureau, Doctor Foster. I spoke to senators and representatives and to health committees, and coöperated with our splendid Secretary Lane, who are enthusiastic on conservation of our radium lands, but all to no avail; our senators were, with few exceptions, deaf. If Secretary Lane's plan had been carried out, it would have put radium into the hands of all our marine hospitals all over the country where it would be available. I had hoped for from 25 or 30 different centres. It is not my fault if I control more radium than any one else at present. I shall not be content until I have ten grams. I would like to have radium in every populous centre of the country.

A RARE TYPE OF BLADDER ULCER IN WOMEN: REPORT OF CASES

By Guy L. Hunner, M.D.
Baltimore

Mercier,[1] in 1836, first called attention to ulcerations developing in the floor of the loculate bladder and causing perforation. He reported cases following chronic cystitis, and trophic cases or those following diseases of the nervous system.

Lawson Tait,[2] in 1870, placed on record two cases in which his predecessor Sir J. Y. Simpson made a vesicovaginal fistula for intractible bladder ulcer. Tait reports a third case in his care at the time and for whom he had attempted the use of a urethral drainage catheter to imitate the rest conditions obtained by the fistula. The patient could not tolerate the catheter and he proposed making the vesicovaginal fistula.

These cases were reported before the days of cystoscopy, and Tait infers that they belonged to the class of cases described by Rokitansky as limited perforating ulcer, resembling in many respects perforating ulcer of the stomach. These conclusions were drawn because of a fourth case in which he saw the autopsy and found a limited deep ulcer destroying the muscular as well as the mucosa coats of the bladder.

[1] Ulceration et perforation spontanees de la vessie, Gazette Medicale de Paris, 1836, p. 257 et 273.

[2] On the Cure of the Chronic Perforating Ulcer of the Bladder by the Formation of an Artificial Vesicovaginal Fistula, The Lancet, London, 1870, vol. liv, p. 738.

All four of these cases were in young women, and all had presented intense symptoms uncontrolled by the usual forms of treatment, and for these and other reasons based on his observations made on the postmortem case, Tait classified them as chronic perforating ulcer of the bladder, although as Le Fur remarks, "It is very likely that the first three cases had some form of simple painful cystitis." This is made the more probable in the first case by Tait's report that she always had alkaline urine which, as we know today, is suggestive of a proteus infection often accompanied by ulceration and deposits of urinary salts.

We are indebted to E. Hurry Fenwick for the most painstaking and exhaustive presentation of the entire subject of simple ulcer. In his first paper on the subject,[1] he speaks from an experience of eight years with this form of ulceration and reports six cases. Most of them had occurred in young men free from venereal history. The onset was sudden, consisting chiefly in slightly increased frequency of micturition. Blood appeared subsequently and the hematuria was intermittent. The marked feature was a constant pain at one part of the penile urethra; and in some this was greatly increased by exercise, or by jolting or overholding water.

In a later publication[2] he compares the solitary simple chronic ulcer of the bladder with ulcer of the stomach. He is apparently unaware that Rokitansky and Tait had forestalled him in this comparison. To quote Fenwick rather fully: "The diseases have certain features in common; they may, indeed, be identical in causation. Both occur on the posterior wall of the viscus, near an orifice. Both chronic forms are usually solitary, both may originate in lymphoid nodules. In both, the chief symptom is profuse hemorrhage. Both tend to scar, and their cicatrices to warp

[1] British Med. Jour., 1896, vol. i, p. 1133, "The Clinical Significance of the Simple Ulcer of the Urinary Bladder."

[2] Ulceration of the Bladder, 1900, J. & A. Churchill, London, p. 8.

the normal contour of the viscus. The bladder ulcer is probably, like the duodenal ulcer, more common in men; the gastric in women. It must be distinctly understood that the solitary simple vesical ulcer will be rarely encountered."

The ulcer is usually single, rarely exceeding the size of a silver quarter. It is situated usually to the inner side of the ureteric orifice but not affecting the trigone. Its edges are raised and thickened and its base is uneven and sloughy, but not deep. The surface is often obscured by a deposit of phosphate of lime.

After this brief review of the chief features of the Fenwick ulcer, I am confident that I am presenting for your consideration a group of cases of simple ulcer of the bladder differing in many respects from the Fenwick type of ulcer.

This group presents a strikingly uniform picture, an appreciation of the features of which, by our profession, will save the patient much suffering, both from errors in diagnosis and consequent futile operations on other organs, and from the unnecessary prolongation of ordinary cystitis treatment when more radical measures are demanded.

These ulcers have been found in women, my work being confined to that sex. They probably occur in men. The average age of the eight women on first consultation was thirty-seven years, but the average duration of the bladder symptoms was seventeen years, making twenty years the average age at onset. Cases III and VII stated that they had had bladder trouble as long as they could remember. In striking the average for the group, I arbitrarily placed their onset age at fifteen years or about the menarche.

In none of the histories could I determine an immediate cause for the bladder lesion.

Three of the patients were unmarried, and there was no reason from the history or examination to suspect a former gonorrheal cystitis. Of the five married women, all had borne children, but in three of them the bladder trouble

antedated childbearing, and in the other two the bladder symptoms came on, in one, eleven years, and in the other one year after the last childbirth; so we cannot ascribe their trouble to puerperal infection. In no case was there a history of operation or catheterization to give an opportunity for possible traumatic or infectious origin from such sources.

If we accept the usual view that either an embolus or a thrombosis of a bloodvessel is immediately responsible for simple ulcer of the bladder and cast about for the distant focus of infection in these cases, we find very little of even suggestive importance.

With the possible exception of Case IV, who gave a history of indefinite bladder symptoms since scarlet fever at six years of age, and who later recalled that for weeks after peritonitis (appendicitis) at twelve years of age, she suffered intensely on voiding, none of the cases gave a history of acute infectious fever immediately preceding their bladder symptoms.

Case I had her bladder symptoms exaggerated when she caught cold, but there is nothing said in her history about tonsil or sinus infection.

Case II had complained of rheumatism for several years and has had occasional attacks of rheumatism while under my care for the past six years, but I have been unable to find a source of origin.

Case III had an attack of tonsillitis twenty years ago, but has had no throat trouble since, and she had been treated for bladder trouble before the tonsillitis attack.

Case IV, as noted, may possibly have followed scarlet fever or an acute appendicitis attack.

Case V never had evidence of tonsil or sinus trouble, but had had rehumatism of the left knee intermittently for three years. Her bladder symptoms antedated this by three years.

Case VI had scarlet fever as a child and had nocturnal enuresis up to the menarche at fourteen years of age. Her

severe bladder spasms began six months after the first menstruation.

Case VII had never had tonsillitis. As a child she had measles, mumps, and whooping-cough. Her bladder symptoms had been present as long as she could remember.

Case VIII had had severe temporal headaches since childhood, more likely to occur around the menstrual period, and for two years she had noticed stoppage of the right nostril. Nasal and x-ray examination revealed marked disease of the right frontal sinus.

Case II gave a history of the passage of a ureter stone five years before her bladder trouble began; and Case VII, who had bladder symptoms all her life, had passed a pea-sized stone from the bladder ten years before consultation.

In view of the causal relationship which I have previously pointed out[1] between chronic urethritis and infections of the tonsils, adenoids, sinuses, and teeth, there may be some significance in the fact that every one of these cases had a granular urethritis. The tenderness and scar tissue contraction was so marked in most of the cases as to require thorough cocainizing and careful manipulation in order to do satisfactory cystoscopy. Fenwick emphasizes this urethral hyperesthesia in most cases of non-malignant ulceration of the bladder and advises chloroform anesthesia for cystoscopic examination. It is possible that the bladder ulceration and the inflammatory condition of the urethra may have a common cause, or it may be that the frequency of voiding and straining bring about an hypertrophy and hypersensitiveness of the sphincter region.

After these remarks bearing on the etiology, let us now return to a consideration of some of the clinical features associated with the ulcer itself. These ulcers have all been found in the vertex or summit or free portion of the bladder; this being one important distinction in comparing the simple

[1] Jour. Amer. Med. Assoc., vol. lvi, p. 937, also International Clinics, vol. iv, twenty-second series.

solitary ulcer of Fenwick, which is found on the base or fixed portion of the bladder.

In three of the cases (Cases I, II, and III), the ulcer was well forward—just back of the symphysis; in four (Cases IV, V, VI, and VII) it was in the summit with a tendency in Cases IV, V, and VII to occupy the posterior pole region, while in Case VIII there was an ulcer area near the posterior pole and another on the left anterior wall immediately back of the symphysis.

With the knee-breast posture and the Kelly cystoscope we are at some disadvantage in locating ulcers on the anterior or pubic wall. On the other hand, a chief characteristic of these ulcers is the extremely slight mucous membrane change found in certain periods of the ulcer, and I am confident that we have an advantage over the Nitze method in our clearer definition obtained by direct vision through an air medium. We have another great advantage in using the knee-breast posture and air distension in being able to study the ulcer under similar conditions at all times. Fenwick warns against positive conclusions from one study of an ulcer through the magnifying cystoscope which gives such different pictures at varying distances, and the ulcer itself varying in size and appearance with different amounts of the distending fluid.

While cystoscopy usually reveals only one inflammatory spot, there may be two or three granulation areas near together or somewhat separated, and operation usually reveals a more extensive area of inflammation than was appreciated by cystoscopy.

The ulcer area may be easily overlooked and the attention may first be arrested by an area of dead-white scar-tissue. In the neighborhood of this scar-looking area, one sees one or more areas of hyperemia which, on being touched with a dry cotton pledget, or with the end of the speculum, bleed and first show their character as ulcers.

In other cases, or perhaps at subsequent examination on

the same case, the ulcer may be well defined as a deeply-red area with granulating base and with congested vessels surrounding the area. In none of these cases has an individual ulcer area been more than a 0.5 cm. in diameter, although two or three such ulcers have at times been grouped in a larger inflammatory area.

At certain examinations the central inflammatory area is found surrounded with a fairly wide area of edema. This was seen on one examination in Case V and it was much more marked at operation. In Case III, whom I had examined many times, edema was never seen at cystoscopy, but at operation an edematous oval area of about 5 x 3 cm. surrounded the central ulcers, and this was removed with a margin of 1 cm. of normal mucosa.

In Case II, in addition to the small ulcer area in the left vertex which had been studied for the past six years, there has occasionally been a slightly congested area near the posterior pole, perhaps 4 cm. distant from the ulcer, and on one occasion there was edema about this posterior pole congestion.

I am not prepared to estimate the significance of this edema area, but until we know more about it, I shall try to excise it entirely at operation. I have never noticed it in any other class of bladder operations. I think some of the edema area was left in Case V and she is the only one of our five operated cases who is not well.

Fenwick describes what I take to be a similar phenomenon in relating the case of a boy of seventeen who was supposed to have acute perforation of a simple base ulcer. He says:[1] "I cystoscoped at once under anesthesia, the boy flinching and moaning at three and a half ounces distention. The entire surface was puffed up as if Schleich's submucous injection had been employed—infiltrated by air and water, a condition I had not met with before or since." While I

[1] Ulceration of the Bladder, p. 13.

am inclined to take issue with Fenwick as to the cause of this acute edema, I refer to the case as the only reference to this phenomenon I have seen in the literature.

The cystoscopic picture reveals the granulation surface as on the same general level as the surrounding mucosa, in other words, one would describe these ulcers at cystoscopy as being superficial. I have never seen a deposit of urinary salts on one of this variety and the surface has never shown the ragged, irregular character suggesting a possible malignancy.

At operation, after opening the bladder, the slight granulation surface can be easily detected with the bared palpating finger, and one is surprised, after the cystoscopic picture suggesting a simple superficial process to find at operation that some of these inflammatory processes extend through the bladder wall and involve the peritoneum.

It is probably this deep-seated character of the inflammatory process that accounts for the train of symptoms in some cases, including, "a stiff feeling of the bladder," "a feeling as if the bladder contains a splinter," "necessity of sitting down in a certain manner," "pain if the bowels are constipated," "pain if there is gas in the bowels."

The urine presents a macroscopical normal appearance and the few leukocytes and red blood corpuscles present may be entirely overlooked with the microscope unless care is used to settle or centrifugalize the specimen. Indeed, the patient may come complaining of her usual symptoms, at a time when the ulcer is temporarily closed and the urine is absolutely negative on microscopic examination. At her next visit there may be the usual urine picture of a few leukocytes and a few red blood corpuscles, found only on careful examination, and cystoscopy reveals a granulating area, or a slightly hyperemic area which oozes blood on being touched.

The most characteristic sign or symptom of simple ulcer as described by Fenwick and others is hemorrhage. Only

one of my eight patients ever noticed anything abnormal in the urine. Case VII had seen blood at times, but when she came for treatment, the urine as in all the other cases looked macroscopically clear and contained only a few red cells and a few leukocytes.

The symptoms of this form of bladder ulcer, the difficulties of diagnosis, and the requirements of treatment can best be illustrated by a report in detail of the cases.

Case I.—Miss M. A. S., aged thirty-five years, first admitted to the gynecological ward October 22, 1900, Gyn. No. 8255. The patient complained of bladder trouble for seventeen years, consisting of severe cutting pain before and during micturition, and frequency of micturition, getting up ten or twelve times during the night. She does not know of any cause for the bladder symptoms. She is always worse when she catches cold and the condition tends to get worse at intervals although she is never free from some discomfort.

Her general health has been excellent. The urine has always seemed normal. She has never noticed any blood or sediment. Physical examination negative.

Cystoscopy. The urethra is very small, barely admitting a 6 mm. speculum after using the cone dilator. The urethra was dilated with the Hegar dilators up to 8 mm. Bladder somewhat reddened around the trigonum, otherwise normal. The first urine examination reports clear, acid, 1020, no casts, leukocytes, or blood, a few epithelial cells.

After ten days in the hospital, in which the urethra had been dilated several times, the patient was discharged as improved, but was advised to return to the cystoscopy clinic. At one of her visits to the clinic I discovered a small round ulcer area in the upper right vertex of the bladder, rather close to the symphysis bone. After a number of local applications to this area of twenty per cent. silver nitrate solution without permanent benefit, the patient was readmitted to the ward July 24, 1901. For the three or four previous

weeks the pain had been almost constant, with painful and frequent urination. The pain was increased by any movement. Since some time in January she had felt a constant localized pain which she described as "very sore, like a boil, about the size of a five-cent piece and on the right side of the bladder." She had lost weight steadily in the last six or eight months, falling from one hundred and twenty-six to one hundred and eight pounds. The patient was in the hospital for two months on this visit. At first we were trying the Young method of over-distention of the bladder, 150 cc. of boric solution being her limit of content on admission. We got the bladder to hold 225 cc. after one month of hospital treatment, and in the next two weeks it reached a capacity of 400 cc. In addition to the over-distention of the bladder we had been using irrigations of silver nitrate solution and of Thompson's fluid. At the end of two months the patient's symptoms had improved steadily but she still had a small granulation area in the right vertex about 5 mm. in diameter. There was no apparent depressed ulcer as at first. The bladder held 530 cc. of boric solution and we were touching the granulation area with silver nitrate 20 per cent. about every ten days. The urine on this admission was examined carefully and on each occasion a few leukocytes and a few red blood corpuscles could be found.

After this great improvement in the patient's bladder capacity she returned from time to time for dispensary treatment. She was never entirely free from her nagging pain and in July, 1905, after a severe cold, her bladder symptoms were much aggravated.

She entered the hospital for the third time in March, 1906, and on March 28, Dr. Kelly excised the upper portion of the bladder.

Cystoscopy under anesthesia revealed in the right vertex the old area which now appeared as a diffuse reddening about fifteen mm. in diameter and contained several small granulation areas. On the left side of the vertex an area

not discovered before showed an ulcer 4 mm. long and 1 mm. wide. After opening the bladder in the mid-line, a third ulcer area was discovered farther posterior in about the mid-line. These areas were all excised and the bladder was closed, a small suprapubic drain being left to Retzius' space.

The patient was kept in the hospital for five months under irrigations and local applications to an inflammatory area in the posterior bladder wall.

She was dismissed in August and returned for a few days in October. At this time she had gained in weight but was still having severe bladder symptoms and cystoscopy showed an area of local reddening in the posterior wall. She had become a nervous wreck and had severe gastro-intestinal disturbances.

She was sent home and returned for irrigation and distension of the bladder with silver nitrate solution and at the same time had medical treatment for her indigestion. After a few months she had improved markedly and I did not hear from the patient again until about November 1, 1914, when in answer to a letter inquiring after her present condition, she called at my office.

She had gained about thirty pounds and stated that she was in better health than she "ever expected or dared hope to be."

She formerly did seamstress work because, as she explained, it was necessary to do something that allowed her free access to a toilet room. Now she is a hair dresser and walks from one patron to another in order to be out of doors. She frequently covers more than ten miles a day and this without fatigue and without bladder symptoms.

Case II illustrates several points which taken together form a picture which might be considered a composite of the group. These points are in her case, first, the long duration and intensity of her bladder trouble, its amenability to temporary improvement, but its obstinacy in resisting permanent cure by our ordinary methods of treatment.

Second, the clear urine negative to bacterial culture and in which a few leukocytes and red blood corpuscles are found on careful microscopic examination.

Third, her examination with negative results by a cystoscopist than whom we recognize no superior, to be followed a year later by my negative cystoscopic examination and my outlet operation and supravaginal hysteromyomectomy without benefit to the bladder condition.

Mrs. F., aged fifty-four years, first consulted me April 27, 1908, complaining of bladder trouble. She had been married twenty years and was the mother of three children, the youngest aged fifteen years.

About four years previously she had missed her menstrual period for one week and then had a week of rather free bleeding. This had been the only menstrual irregularity of her life.

Ever since that period she had bladder symptoms, consisting at first of a frequency and the necessity of voiding at night. This urgency had increased until she was getting up ten or twelve times at night and could seldom hold the urine longer than one hour in the day. If compelled to hold the urine there was a pressure feeling which soon increased to a severe pain. The bladder frequency was worse when she was constipated and she often found relief by taking an enema.

Nine years previously she had an acute attack of pain in the right side, and after a hypodermic of morphia she passed a small stone on voiding. She had never seen blood in the urine. She had had touches of rheumatism in the shoulders for many years. One year previous to my examination she had been in Dr. Kelly's sanatorium for a few days, where, after the finding of a few leukocytes and red blood corpuscles in the urine, the urinary system was carefully examined by cystoscopy, catheterization, x-ray examination, and guinea-pig inoculation with negative results.

A few months later a physician in Philadelphia gave

bladder instillations for two weeks and she was so much better that for three weeks she considered herself cured.

On my first examination the urine looked perfectly clear and the microscope showed a few epithelial cells and a few cells about the size of leukocytes but so granular that they were taken for small round epithelial cells. Albumin test was negative.

The outlet was considerably relaxed, showing marked tendency to cystocele and a lack of support in the posterior walls. The uterus was considerably enlarged, with several small fibroids.

The external urethral orifice was bright red in color and tender and the urethra was narrowed, dilating to 10 mm. with some difficulty and eliciting complaint of pain. Pressure over the lower left ureter region caused pain and a great desire to void.

My first outline of treatment proposed treatment of the chronic urethritis and placing of a pessary to overcome dragging on the part of the enlarged descended myomatous uterus. If this failed to relieve, I proposed anterior and posterior colporrhaphy and supravaginal amputation of the fibroid uterus.

On the second and third visits I found the urine clear but showing many epithelial cells and about the same number of small round cells which proved to be leukocytes when stained with methylene blue. At each of these visits the urethra was dilated with the 10 mm. dilator and swabbed with 3 per cent. silver. With a tenaculum on the cervix, the uterus could be pushed up in the pelvis or dragged down to the vulva orifice without causing her bladder symptoms, and for this reason I was not sanguine of the beneficial effects of pessary treatment.

After three weeks of study of the case I decided to operate and did anterior and posterior repair and supravaginal amputation of the fibroid uterus.

During the patient's convalescence in bed she had prac-

tically no bladder symptoms and we were hopeful of a satisfactory result, but, as soon as she began to get into the wheel chair, and later, on walking, her old symptoms returned.

After her summer vacation I saw the patient again September 14, four months after operation, and she declared that there had not been improvement in her bladder condition. I again took up the treatment of her reddened and tender urethra, and about a month later, on finding a few red blood corpuscles, together with a few leukocytes in the urine, I decided that there must be some bladder lesion, and after thorough cocainizing I got the patient to relax more than usual and succeeded in finding a small, granular, red area in the vertex of the bladder on the left side just back of the symphysis bone. This explained the observation made on the first visit and on several subsequent visits of pain and desire to void on bimanual examination of the left ureterovesical region. These symptoms were caused by pressure on the ulcer region, but in the failure to find an ulcer by cystoscopy they were supposed to be due to some relationship between the lower ureter and the fibroids.

For the past six years I have treated this patient by different methods and have been able to keep her reasonably comfortable a portion of the time.

Because of a marked family history of tuberculosis, I suspected that this solitary ulcer might be tuberculous, although I have never met with a tuberculous ulcer of the bladder unassociated with kidney tuberculosis.

From October, 1908, to May, 1909, she was treated with instillations of 1 to 10,000 and then 1 to 5000 bichloride of mercury solution, and on May 10 the following note was made: "Patient says she feels well. Sometimes at night when the bladder is overfull there is pain."

Cystoscopy. Cannot find a red area of mucosa. Apparently cured. In view of the occasional pain there may still be some inflammation in the depths of the bladder wall.

October 28, 1909.—After her summer vacation she reported a fairly comfortable summer, but now again has "a toothache in the bladder" and is voiding four times at night. The red area was again found as before. It was exceedingly sensitive on being touched.

Another course of bichloride instillations was followed by a course of Gomenol oil instillations. The Gomenol twice a week seemed to give great relief at first, but after a few weeks she asked for the bichloride again, stating that while it gave temporary discomfort, its after effects were more lasting than those of the Gomenol treatment.

In the spring of 1913 she was treated for several months with applications every ten days or two weeks to the ulcer area of 10 per cent. silver nitrate solution.

This treatment was again followed during the winter and spring of 1913–14. On May 25, 1914, her note reads, "More comfortable than for years up to the past week, when she thinks the eating of strawberries has brought on the irritation again."

During these six years of observation of her ulcer the picture has varied considerably. On several occasions the ulcer has seemed to heal over completely when there would be an absence of leukocytes and red blood cells. At other times it has presented as a well-defined circular red area 2 or 3 mm. in diameter surrounded by a few congested vessels. At such stages it had the appearance of a punched-out stomach ulcer. At times, extra pale white scar-looking areas were noted near the ulcer.

Again there would be a linear, moth-eaten appearing area perhaps 1 cm. long and 1 or 2 mm. wide with increase of vessels about. At times, when at its worst, there would be an intensely congested area of 2 to 3 cm. diameter. At one such time an area of edema was seen at a little distance medianward near the posterior pole of the bladder.

When the ulcer gave most symptoms, the patient was likely to complain of bowel symptoms as well. She was more

than half convinced on several occasions that she was developing cancer of the bowel. There would be pain after eating and just before a movement of the bowels. Gas caused great pain in the sigmoid region.

Touching the ulcer with 10 per cent. silver nitrate solution, imitated these bowel pains and again convinced the patient that her bowel symptoms originated in the bladder condition.

After her systematic treatment during the spring of 1914, and a quiet, restful summer vacation, this patient has considered herself too well to return to me for treatment this fall. At my request she came for inspection November 26, 1914.

She has to get up only about three times at night. She can hold the urine three hours in the day and can attend lectures and the theatre without serious discomfort. She still has some bowel pain at times, especially when constipated.

Cystoscopy. In the site of the ulcer area in the left vertex is a dead-white scar-looking area surrounded by a slightly increased number of vessels. On touching this area the patient says there is no doubt about my touching the old spot. She immediately developed such a bladder spasm that I was not able to see the effect of touching the area.

The urine showed a considerable number of epithelial cells but an absence of leukocytes and red blood corpuscles. There was no albumin.

Case III.—Mrs. S. A. G., aged forty-five years, married twenty years, three children, youngest aged nine years. The patient first consulted me January 9, 1913, saying that she had been suffering with bladder trouble off and on all her life. She had been treated for acute attacks of bladder trouble before her marriage. Since her marriage she was free from bladder trouble while pregnant and for a year after. With her last pregnancy the bladder trouble disappeared as usual and did not come back for several years.

Two years ago she had repair of the outlet and suspension of the uterus in the hopes of relieving the bladder trouble. She thinks the three weeks of rest in the hospital did her good, but she has been gradually getting worse during the intervening two years since operation.

About two months ago she had the worst attack she ever had, being confined to bed for some days with spasms of pain and contractions of the bladder. In addition to her attacks of severe spasms and straining in the bladder region, she has an almost constant discomfort which seems to her like some "womb pressure" or pressure between the vagina and rectum. There is often a stiff feeling as if a splinter were caught in the bladder. This is aggravated by change of position, particularly by sitting down. She is more comfortable while standing or walking than in the sitting posture. When the bladder gets full she has to void quickly or has almost unbearable stabbing pains which continue for some time after emptying the bladder. Throughout the history of her bladder trouble she has been most comfortable during the week of her menstrual period.

She never had local treatment. She never saw blood or sediment in the urine. She never had rheumatism. She had an attack of tonsillitis twenty years ago but no throat trouble since.

The urine examination on the first visit showed a considerable number of epithelial cells and mucin shreds and an occasional leukocyte—no albumin—no sugar.

Cystoscopy revealed several areas of congestion over the posterior bladder wall and in the vertex. After three instillations of silver nitrate solution 1 to 1000 given at three-day intervals, the bladder mucosa appeared quite normal except for one area in the vertex. This was seen on more careful examination to consist of three areas of granulations each about 3 mm. in diameter and all located within a radius of about 2 cm. They had the appearance of being very superficial and from the prompt way in which the other

congested areas in the bladder had disappeared, I fully expected to see rapid healing of the vertex areas. I therefore sent the patient home and wrote her home physician to have a nurse carry out the instillation treatments with 1 to 1000 silver.

She returned for examination at monthly intervals for about five months and there seemed to be very little or no progress made in her condition.

I then had the nurse's instillations discontinued, and for about a year the patient came to Baltimore about once in six weeks and had the ulcer area swabbed with 10 per cent. silver nitrate solution after anesthetizing with 10 per cent. cocain. After each of these treatments the patient had rather more discomfort in the bladder for about one week and then had three or four weeks of comparative comfort, when the bladder would gradually begin to give more and more discomfort, which she would stand for about two weeks longer and then come for another treatment.

On May 7, 1914, I used the high-frequency current to cauterize the vertex ulcer, and this caused so much pain and soreness for a week afterwards that she did not wish the treatment repeated. After this treatment the patient herself made the suggestion that she would like the ulcer excised if there was a prospect of ending her trouble by this method. She wished, however, to put up with her condition during the hot weather and return for operation in the fall.

Office note November 5, 1914: "Patient states that she has had a fairly comfortable summer, but has to void rather more frequently now than when she was taking regular treatments. She still has the stiff feeling in the right side of the bladder when she walks or sits down. She feels that she has to sit in a certain manner or she will get the sharp, jabbing pain.

Urine catheterized from the bladder looks perfectly clear. After standing four hours it is pipetted and thoroughly centrifugalized and nothing can be found microscopically

but a few epithelial cells. No leukocytes and no red blood corpuscles found. Culture is negative to growth after four days.

Careful cystoscopy reveals a slightly increased number of vessels over the posterior wall. This may be due to the preliminary bimanual palpation of the pelvic organs. In the right vertex near the symphysis bone and at the junction of the anterior wall with the superior wall is the diseased area, represented by two extra-pale white areas each 2 to 4 mm. in diameter and these separated and surrounded by slightly congested areas. This would easily be overlooked if one were not looking especially for it."

The patient was sent to the hospital for the Women of Maryland, for excision of the bladder ulcer, amputation of the cervix, and repair of the outlet.

Operation November 7, 1914: Excision of the bladder ulcer; closure of diastasis of abdominal walls; amputation of a large cervix, freeing base of bladder and bringing the broad ligaments across anterior to the cervix; excision of triangles of the anterior vaginal wall where the bladder was freed; repair of the posterior perineum.

After the patient was under anesthesia she was placed in the knee-breast posture to enable Mr. Brödel to make sketches of the bladder condition. The area in the right vertex that forty-eight hours previously showed irregular white-scarred mucosa with congested areas bordering on the scars, today under anesthesia shows one congested area about 12 mm. long and 8 or 9 mm. broad. The congested appearance was caused by the meeting of several moderate-sized vessels which split up into numerous small twigs.

Mr. Brödel remarked that he would have to use his imagination to see anything abnormal. On touching this area with a dry cotton pledget there were immediately two oozing spots near the centre of the congested area and the increased vascularity covered a considerably larger area, perhaps 3 by 1.5 cm.

The bladder was left distended with air, and on turning the patient to the dorsal position the bladder eminence could be seen for about 8 cm. above the symphysis. She was placed in the elevated pelvis position and her former abdominal scar was excised.

On locating the diastasis of the recti, the incision was carried two-thirds of the distance to the umbilicus in order to make an overlapping closure of the abdominal walls.

The bladder was separated from the symphysis down to the urethra without difficulty and without finding adhesions on the right anterior wall. Incision was made through the vertex and a good exposure showed the ulcer area to be located more toward the posterior wall than was estimated by cystoscopy, so the peritoneum was peeled away to free this posterior right wall. Incision was made in the median line, and by the time the ulcer area was located the bladder in this region was edematous over an oval area about 5 cm. by 3 cm. in extent. This edema area showed two bleeding ulcers near the centre and several areas of brilliant red ecchymotic spots about the borders.

The entire edema area was excised, leaving a margin of 1 cm. of normal-looking bladder mucosa.

The irregularly oval bladder opening was closed by a running lock stitch of No. 2, twenty-day, chromic catgut, passed through all the coats of the bladder. A mushroom catheter was sewed to the bladder edge and then to the skin edge and a cigarette drain was placed down to the bladder wall to drain the space of Retzius.

The abdominal wound was closed with No. 3 chromic catgut overlapping the fascia to take care of the diastasis in the upper portion of the wound and to buttress the scar tissue of the former operation in the lower portion of the wound. A few reinforcing sutures of silkworm-gut were passed through the skin, fat and fascia. The patient had an unusual amount of pain and bladder contractions for the first four or five days, due, I think, to an error in suturing

the rubber tube both to the bladder wall and to the skin surface, thus suspending the bladder against free movements. On the night of the third day, there was considerable oozing of blood from the suprapubic wound, which continued off and on for four days. This was probably due to failure of tying individually some one of the larger vessels, and this later began to bleed, probably because of the bladder straining, due to the fixation by the catheter.

Irrigations of 1 to 10,000 and later 1 to 5000 silver nitrate solution were given daily through the retention catheter until its removal on the twelfth day, and then through the urethra until the patient went home on the thirty-fourth day. There was still a slight growth of staphylococcus and a few leukocytes in the urine when the patient went home, and her physician was instructed to continue the irrigations for another two weeks.

In a letter written two months after the operation the patient states, "I have not felt that old pain at all, which seems too good to be true. I have not walked very far yet, but am doing a little more each day."

Case IV.—Miss M. E. S. C., aged thirty-five years, was referred to me on July 4, 1913, by Dr. J. Albert Chatard. Dr. Chatard had sent her into the Johns Hopkins Hospital to have an operation for appendicitis, although he considered her symptoms of an indefinite and rather unsatisfactory character.

The history taken at the hospital was briefly as follows: Complaint: pain over lower abdomen, nausea and vomiting. Family history: negative as to tuberculosis and cancer. Personal history: general health good until the onset of the present illness. Menstrual history: regular until ten months ago. Since then, irregular, except for regular periods the last two months. A four-day flow, rather profuse, not painful. Urinary history: the patient had an attack of scarlet fever when six years of age and since then has had slight pain on voiding; this has been rather less severe for

the past ten months. Present illness: For the last eight months the patient has had occasional attacks of nausea, pain and vomiting; the present attack began four days ago with pain over the lower abdomen, nausea and vomiting. The pain was very severe, cramp-like in character, and radiated over the entire abdomen but was most marked in the appendix region.

The patient's temperature on admission was 97.5° F., pulse 64. She was extremely nervous and resisted palpation over the lower half of the abdomen. The uterus was found in retroposition. The patient was very stout, and in view of her indefinite and unsatisfactory history, the incision was made in the median line above the symphysis. The appendix was small and fibrous and undergoing complete obliteration at its outer end. It did not appear at all inflamed, but from its condition of chronic infiltration we were fairly satisfied that it had been the seat of her complaints.

The uterus, tubes and ovaries were bound posteriorly by dense adhesions. These were freed and the uterus was suspended forward by a Coffey round-ligament shortening.

The patient had a phlebitis of the left leg, the symptoms developing on the fifteenth day, and she went home in an ambulance on the thirty-fourth day.

After rather an unsatisfactory year, Dr. Chatard sent her to me again July 16, 1914. She was complaining of a pain in the right side in the appendix region and a feeling as if gas was accumulating in this region. This pain is present most of the time, but it gets worse about a week before the period and lasts half through the period. It is least marked for a week or so after the period. She feels as if there is a "terrible pressure in the side" which produces the pain.

On May 1, 1914, she had a severe attack of pain which she thinks differed from her previous discomforts. There was a sudden, sharp, shooting pain which she thinks was in the vagina. She could not sit down and could not walk.

This first attack lasted about twenty minutes. About June 1, she had another similar attack lasting three hours. About July 1, a third attack, lasting an hour, came on just as she was going to bed, as a sudden sharp pain in the vagina region. These three attacks were not associated in any way with the period. The first and last of these so-called vaginal attacks came on just after she had urinated.

There had been much nausea and heavy feeling in the abdomen in these attacks, and she considered the attacks much like the indigestion spells she had before her appendix operation. She is often nauseated after eating, just as she was before the appendix operation.

On examination, she was resistant over the appendix region. A careful vaginal and pelvic examination was negative. The urethra took the glass catheter with some resistance and the patient said it reminded her of the sharp attacks. After bathing with 10 per cent. cocain the urethra was dilated with some difficulty up to 8 mm. With a seven and one-half Kelly speculum the urethra was found to be granular red. I concluded from this examination that her three recent attacks of "pain in the vagina" were urethritis symptoms. The urine was clear, but on careful microscopic examination a few leukocytes were found, suggesting trouble higher than the urethra.

On her next visit cystoscopy revealed a congested area in the posterior wall of the bladder rather near the vertex. There were small granulation areas and small areas looking like submucous hemorrhages, and there was a considerable increase in the number of vessels about these areas.

For the first time, I suspected that this patient's symptoms from the beginning had been due to her bladder and that she represented one of the chronic simple ulcer cases. I referred to the Hopkins Hospital history and had these views confirmed by finding that on the day of her admission a voided specimen of urine showed a few epithelial cells, a few white blood corpuscles and a few red blood corpuscles, although her menstrual period was not due at that time.

Such evidence would be more valuable had the report been on a catheterized specimen of urine, but in a review of her entire history I feel certain that her trouble in recent years has been due to the bladder rather than to the appendix.

She was one of the most unsatisfactory patients, from the standpoint of history taking, that I have ever met. By reference to her first history at the Hopkins it will be seen that she complained of pain on voiding since her scarlet fever at six years of age, but this she reported as being less severe during the ten months previous to her admission. It will be noticed also, on reference to her later history, that the three severe attacks of May, June, and July, 1914, had been considered by her as pain in the vagina and that two of these attacks came on just after she had urinated. At no time did she complain of having to be up frequently at night to urinate, or of voiding too frequently in the day-time. These points were brought out by direct questioning after finding the bladder congestion. She had intervals of comparative freedom, but when the attacks came on, to quote from a letter written later, "the voiding would be most frequent, sometimes five or six times an hour for several hours. This trouble was particularly severe after I had peritonitis, when I was twelve. It was so severe for weeks after my recovery, that I screamed every time there was the slightest voiding." Of course these symptoms may have been due to perivesical adhesions following an attack of appendicitis and pelvic peritonitis.

During her summer vacation, the patient had seven instillations of 1 to 1000 silver nitrate solution and I saw her again on September 3, 1914. She had had none of the old paroxysms of pain, and she had not been up so often at night. There had been much indigestion in the form of "gas pressure" in the old appendix region. She was voiding every one to two hours in the day, and had her old steady, nagging pain in the lower abdomen which she now recognized as a bladder pain.

The patient was obliged to return to her work in St. Louis, and I referred her to Dr. John Caulk for further study and treatment.

Case V.—Miss E. M., aged thirty-three years, referred in September, 1913, by Dr. W. F. Scott, of Birmingham, Alabama. Her family history and menstrual history are without significance. She has never had any evidence of tonsil or sinus trouble. She has had some rheumatism of the left knee for the past three years.

Her bladder trouble began six years ago as a frequency of voiding, and this symptom continued without intermission for three years. During these three years she had bladder irrigations without apparent relief. A "polypus" was removed from the urethra, and this seemed to be of some benefit. For the past three years she has continued to have the frequency and, in addition, has suffered with much pain. During these past three years she has been in the hospital five times. She first had a vesicovaginal fistula made, and while this was open for six months she had complete respite from her bladder symptoms. As soon as the fistula was closed she began suffering as much as before.

Two years ago an abdominal incision was made, and a fibroid tumor, "which had been resting on the bladder," was taken from the uterus. She returned home in two weeks, and two weeks later had to return to the hospital where she remained for seven weeks under bladder treatments. At that time the bladder capacity was raised to 13 oz., but some of the distensions during this time could not be carried beyond 2 or 3 oz. At the present time 2½ oz. is the bladder limit. She is apparently as well and as stout as formerly, and would enjoy perfect health were it not for the bladder misery.

With this history of insidious onset and resistance to all forms of treatment, I thought we must be dealing with tuberculosis of the urinary system in spite of the fact that

her home physician had carefully considered this possibility and had failed to find tubercle bacilli.

At my first examination a small ulcerated point was seen at about the posterior pole of the bladder, and this was surrounded by a small area of edema and swelling, probably 2 cms. in diameter. The remainder of the bladder appeared normal. The urine appeared clear and the microscope showed a few epithelial cells and a few leukocytes but no blood. There was the slightest trace of albumin, and this, together with a negative bacterial culture, tended to confirm the idea of tuberculosis. The fact of there being only an occasional leukocyte in the urine was strongly against a tuberculosis of the kidney of six years' standing, and I did not consider it necessary to look for tubercle bacilli.

On her second examination, three days later, she said that she had been having an unusually painful morning with much straining, and cystoscopy revealed a much larger area of redness in the posterior wall. It seemed as though the entire posterior wall, covering an area of 5 cms. in diameter, was ulcerated or infiltrated. It appeared nodular and edematous.

After these first examinations I left in the bladder 1 oz. of 1 to 1000 silver nitrate solution and this caused extreme pain and soreness. I therefore changed to instillations of 1 to 10,000 bichloride solution, which she bore with much less pain. After two treatments with the bichloride solution, her examination on September 12 showed a perfectly normal-looking bladder except for a red congested streak in the posterior pole, of considerably less dimensions than before seen. Considering this case to be one of the class under discussion, I advised excision of the ulcer.

Operation. Union Protestant Infirmary, September 17, 1913. There was some difficulty in separating the bladder from the old abdominal scar. After reaching the bladder, there was difficulty in separating the peritoneum subtending the ulcer area over the posterior pole of the bladder.

Incision into the vertex of the bladder showed a longitudinal ulcerated area in the posterior wall, bleeding in the centre. This inflamed area had for its lower border, toward the base of the bladder, an area of nodular edematous-looking mucosa about 1 by 2 cm. in extent. The entire inflamed area was 4 to 5 cm. in diameter and about 1 cm. thick in its thickest portion. It was over this central portion that the peritoneum had peeled away especially hard. After excising the inflammatory area more edema was seen along the edge toward the base of the bladder, so another strip about 1 by 3 cm. was excised.

Although I had made a note of this edema condition on my first two examinations of the patient, I had forgotten it at the time of the operation and considered it a phenomenon associated with the operation. The bladder was closed and the wound was dressed as in Case III.

A postoperative note on September 20, three days after operation, states that the patient has had considerable pain in the bladder and a feeling of straining and is passing some urine involuntarily through the urethra, although most of the urine is coming through the suprapubic tube. Today the dressings about the wound are exposed and the rubber drainage tube is elevated and a role of gauze is placed under it in a way to help keep it off the bladder base.

On September 21, the note states that the patient is more comfortable and has less bladder straining. She is getting silver nitrate solution irrigations 1 to 5000 twice daily.

The patient made a rapid recovery and on November 6, about seven weeks after the operation, I received the following letter: "I have been home three weeks now and am still improving. I get up about three times every night; occasionally it has been only once. When I came home I was voiding only 3 oz. and now I have increased to 7 oz." A week later the patient wrote me, in distress, that her old pains had returned and that the bladder capacity had dropped to 4 oz.

In answer to my letter of September 30, 1914, asking for a report of her health, I got the following letter: "I have suffered all the time since I last wrote you in November, 1913. Dr. Scott treated me all the time, but I did not get any relief. In July I got so bad that I could scarcely be up, but suffered worse if lying down. I went to several surgeons for examination, and they told me the same thing, that a fibroid tumor was pressing on the left side of the bladder, a little underneath, so I consented to another operation, thinking I would be relieved.

"The doctors operated August 14, and found five tumors, the largest the size of a bird's egg, on and around the bladder, but they said they didn't think these would cause my suffering.

"That operation was like the other five I have had for the same thing. I got no relief and am up eighteen and twenty times every night and sometimes in the day it is every ten minutes.

I went to Dr. Scott last week, and he said my bladder has only one tiny red spot in it and after irrigation I am no better, so I have just about given up all hope of ever getting well."

In my opinion I left some of the edema area, before described, at the time of her operation and it is this that has developed into an ulcer and is giving all of her former symptoms.

I have written her to return to Baltimore and allow me to make another excision.

Case VI.—Mrs. J. T. P., aged thirty-four years, of Dallas, Texas, was referred by Dr. Young on March 28, 1914, with a note stating that he had investigated the bladder and kidneys with negative results, and asking me to see whether the patient was suffering from any form of urethral trouble. Before consulting Dr. Young the patient had been at Rochester for two weeks under examination by Dr. Braasch, who had been unable to discover the cause of her discomfort.

After returning home she bore her pains a few months longer and then asked to be sent to another specialist and she was referred to Dr. Young.

The patient's family history was unimportant. She had scarlet fever as a child without evident sequelæ. She had been married ten years, and one child was born at term two and a half years after marriage. A perineal tear was immediately repaired. A perineal repair was again done three years later.

Present illness: As a child the patient had nocturnal enuresis up to puberty at the age of fourteen. Six months after the establishment of menstruation the patient had a severe attack of pain at the neck of the bladder causing a spasm which made it impossible to void. For the past twenty years these attacks have recurred, formerly at long intervals, but in recent years becoming more and more frequent. She has been under various forms of bladder treatment for years. Cystoscopic examinations have always yielded negative results. She has been on silver nitrate irrigations for the past two years.

She has spasms of pain at the neck of the bladder several times a day, coming on with no apparent relation to urination or to the amount of bladder distention. She voids about once an hour during the day and several times during the night.

Inasmuch as Dr. Young had reported negative results from examination of the kidneys and bladder, I began cystoscopy with no idea of finding a bladder lesion. On a routine inspection of the bladder my attention was attracted by an extra-pale white area in the vertex just to the left of the median line, and beside this scar-looking area was a slight area of hyperemia. On touching this hyperemia spot with a dry cotton pledget on the alligator forceps, it bled easily, and after the patient returned to the ward she told her special nurse that she was sure I had touched the source of her trouble although I had not informed her of

finding anything out of the ordinary. A careful examination of the urine catheterized from the bladder just before cystoscopy showed a few red and a few white blood corpuscles.

On reporting to Dr. Young, he was inclined to think that my findings may have been the results of a slight burn during her cystoscopic examination by the Nitze method. I would have granted this had I simply found the small superficial ulcer, but from the fact that my attention was first called to the lesion by the neighboring scar tissue, I was inclined to believe that the real source of her trouble had been found. Further examinations in company with Dr. Young confirmed the presence of an inflammatory area in the vertex of the bladder and in view of my previous experience with these cases, coupled with the fact that the patient had been suffering for twenty years and had been treated somewhat regularly for two years, I felt justified in advising operation at once.

Operation (Johns Hopkins Hospital), April 8, 1914.—Suprapubic incision after distending the bladder with water; incision into the posterior part of vertex; excision of an area 3 x 6 cm. to include three distinct ulcer patches.

It was thought from a cystoscopic examination that the ulcer area was somewhat dorsal to the anteroposterior equator of the bladder, and this was found to be the case at operation. After making a 4 cm. long incision into the posterior vertex, with bare fingers, the ulcer area was easily palpated on the mucosa surface. The peritoneum was peeled away from the bladder down to the ulcer area, but here it was densely adherent through a thickened layer of fat to the thickened bladder wall. After excision of the ulcer, giving a wide area of normal-looking mucosa and taking in the perivesical thickened fat, the peritoneum was accidentally opened for several centimeters. This peritoneum looked thickened and a portion was removed for microscopic examination. After the ulcers were exposed in the bladder they were found to be three in number, ranging

from 1 to 2 cm. apart and each area being about 1 cm. in diameter. The one farthest to the left showed more of a thickened white scar area than real ulceration. This was the spot first seen with the cystoscope. After removal the normal portion of the bladder wall was about 2 mm. thick and the ulcerated portion with its white infiltration of scar tissue was about 8 mm. thick.

Closure was by lock-stitch of twenty-day number two catgut, through and through, introducing a small mushroom catheter into the vertex. This was sutured to the bladder wall. The peritoneum was sutured before beginning to close the bladder. This was done with plain number two catgut.

The patient was surprised and delighted with the comparative comfort of the first night after operation. By the third day she said she could relax and rest and had not realized on what a high tension she had been living in her fear of a bladder spasm.

On April 21, two weeks after operation, the mushroom catheter was withdrawn and a small plain-rubber male catheter was placed and held by an adhesive strap across the abdomen. This came out before night and the patient was delighted to find that during the night she held more urine and voided at longer intervals than before the operation. After twenty-four hours there was no further leakage from the suprapubic wound.

On April 30, twenty-two days after operation, a note was made that in the previous night she voided at 7 P.M., 1 A.M., and again at 7 A.M. There were no more bladder spasms and she was perfectly comfortable.

Before leaving the hospital the patient and her husband made a sight-seeing trip to Annapolis, in order to test her condition, as she could not believe that she was ready to return home. She was astonished that the cab and car riding were accomplished in perfect comfort.

There was still a colon bacillus infection of the bladder and a few leukocytes in the urine when the patient returned

home, and she was instructed to have systematic bladder irrigations until these signs of infection had cleared. I learned from her physician in November that she was a woman with many interests in life and that she had not carried out her treatment after getting home. The following letter from the patient written November 12 would seem to indicate that she still had a cystitis at that time. I quote the letter rather fully, as it gives a graphic account of some of her former condition:

"Your letter of October 27 has been forwarded to me here. I had hoped by this time to be perfectly free from bladder symptoms; while I at all times try to be optimistic, must admit that I grow discouraged occasionally.

"I have recalled many times our last conversation and you telling me it would be six months or a year before I would feel normal. I know I have been greatly relieved by the operation, and when I think of the intense suffering that I endured day after day and night after night, I feel ashamed to be discouraged at a slight discomfort. I am now able to hold my urine two or three hours, and sometimes longer; I only have to get up once or twice during the night and sometimes not at all, and rest perfectly easy and free from pain when I am in bed, which I was not able to do before. I can remember when I could not lie down at all without great suffering; I can now sit well back in a chair without pain, whereas before the operation I was compelled to sit on the edge of the chair to relieve all pressure possible. I do not have those terrible paroxysms of pain when passing urine or that spasmodic condition at the neck of the bladder; I do, however, at times feel a decided consciousness in the same old spot in my bladder, enough to create a fear in me that something is wrong, and wonder if it will take only time to perfect a cure. There is a weakness in that spot, and sometimes a hurting, but nothing like as severe as the old pain; and this condition I only feel at times."

Case VII.—Mrs. L. T., Ayden, N. C. While Dr. Watkins was assisting me in the operation on the previous case he remarked that he had a patient in the free ward, who apparently belonged to the same class of cases, as she had had bladder trouble for years and a great deal of treatment before coming to the hospital. He had been treating her for about three weeks and had noticed that the bladder quickly cleared up of a more or less general inflammatory condition, and that the patient felt that she was well enough to go home, but that she still had several small ulcers in the vertex which appeared to be superficial but were not making appreciable progress towards healing. I examined the patient with him and decided that she belonged to this class of cases and advised excision of her ulcers. She had been improving so rapidly since being in the hospital that she was reluctant to have the operation, but she agreed after I explained to her that she would probably no more than reach her home in North Carolina than she would wish that she were back. She had previously had so much treatment of the bladder that she came to the hospital with her mind fully made up that an operation would be necessary.

This patient was aged thirty-one years; she had been married fourteen years and had given birth to four children, the youngest now being two years of age. Her family history was unimportant; she says that one brother has kidney trouble. She has had measles, mumps, whooping-cough, and an attack of malaria about three years ago. She is not subject to headaches, has no disturbances of vision nor of hearing, and has no discharge from the breathing passages. She has never had tonsillitis nor evidence of consumption.

Present illness: The patient says she has always had bladder trouble. She has had attacks at irregular intervals of sharp pain in the lower part of the abdomen, with increased frequency of voiding and burning on micturition. She has noticed blood in her urine during some of these attacks.

During one of these attacks, about ten years ago, she passed a "stone" the size of a pea. She has to get up two or three times at night to void. She says her bladder trouble is always worse at her menstrual period. She has had no abdominal pain except in the bladder region. There has been occasional backache over the left sacro-iliac joint.

The urine was macroscopically clear, but it contained a few red blood corpuscles and white blood corpuscles and a faint trace of albumin.

Operation, April 18, 1914. Excision of an area 2 x 7 cm., including the vertex and a portion of the posterior wall. After ether, the patient was placed in the knee-breast posture and carefully examined. She was then turned to the dorsal position and the bladder was easily outlined by palpation and percussion because overdistended with air. An incision was carried down to the peritoneum, which was stripped back until the transverse rugæ on the anterior face of the cervix at the cervico-uterine junction could be easily palpated.

Incision in the vertex shows the upper ulcers close at hand. The slightly granular surface cannot be palpated with gloves but can be with bare fingers. The ulcer-bearing area was outlined on the bladder mucosa with the knife blade, leaving a safe margin of healthy tissue. With scissors this area was excised from the vertex to the junction of the posterior wall with the base. A slight nick was made in the peritoneum, which was drawn up by the traction on the base of the bladder. This peritoneal opening was closed at once with catgut. The bladder was closed by a through-and-through, whipped, running suture of twenty-day number two chromic catgut. A small opening was left in the vertex and a mushroom catheter was introduced and sewed to the edge of the opening. This region of the bladder, in turn, was sewed to the anterior abdominal wall so that the mushroom catheter could not prolapse and cause pressure ulcers in the base of the bladder. To drain the space of

Retzius of possible leakage around the catheter, one cigarette drain was passed down to the bladder wall.

A letter from this patient, dated November 6, 1914, says that she is feeling very well and enjoying better health than since her marriage. Her only bladder trouble is some frequency after drinking large quantities of water. She sometimes has to void once during the night.

Case VIII.—Mrs. B. G., aged thirty years, first visited the Johns Hopkins Dispensary Clinic May 13, 1914, complaining of frequency and burning micturition. Her menstrual periods were regular and normal. Her family history was negative for tuberculosis—her father died of sarcoma. She had one child eleven years ago. While carrying the child she had some frequency of urination. After the birth of the baby there were no bladder symptoms for about a year.

Ten years ago she began, all of a sudden, to have a severe pain in the urethra. There was a smarting and burning, particularly as the urine passed. These symptoms have been present ever since. When at her worst she has sharp, jagging pains shooting through the bladder, and if she sits for any length of time the bladder seems to get stiff. She has often left her home to go down town and been compelled to return because of the sharp, shooting pains in the bladder. She has often had to leave a street-car and go into a stranger's house to void. She never noticed blood or abnormal appearance of the urine.

The patient has not had rheumatism or tonsillitis, but she has had severe headaches since a child. These have been over the eyes and in the right temporal region. Her headaches are more likely to occur around the menstrual period, and for the past two years there has been an obstruction in the right nostril, the passage closing at night as soon as she lies down. At my request she visited the laryngology department and *x*-rays were taken, showing frontal sinus inflammation.

On her first visit I found that she had considerable reddening about the external urethra, and a tender, granulated condition along the entire urethra. I found nothing abnormal on cystoscopy and wrote a diagnosis of chronic urethritis. Immediately after cystoscopy, however, on looking at the centrifugalized urine, which appeared perfectly clear, I found a few red and a few white blood corpuscles and concluded that there must be some bladder lesion. On her next visit a more careful examination revealed in the neighborhood of the posterior pole of the bladder one or two extra-pale scar-like areas, and in their vicinity a slight increase in vascularity. On touching this area with a dry cotton pledget the patient complained of pain, and there appeared several oozing points.

At other times, in several months' treatment, this area has shown circles of vesicles or granulations of a brilliant red on the white background, suggesting the picture of ringworm.

In addition to this inflammation area near the posterior pole of the bladder, the patient has a small round area just back of the symphysis in the left anterior bladder wall. This area is about 5 mm. in diameter and bleeds very easily on being touched with a cotton pledget. It is much more sensitive than the first described area.

During May and June the patient had these areas treated once a week with 10 per cent. silver nitrate as a local application. She then went away for the summer, and I have been treating her once a week since November 10. Her treatments have made her so much more comfortable that I have not advised operation in her case, and propose, if silver nitrate applications fail to heal the ulcers, to try the effects of the direct cauterization with the electric wire.

There has been practically no change in the appearance of these areas under the silver nitrate treatment, although, as before stated, the patient is much more comfortable.

In his first paper on simple ulcer, previously quoted,[1] Fenwick describes simple ulcer as having a life history of three stages. This classification has been generally accepted by later writers.

These periods Fenwick describes as the first stage, of variable duration, occurring before the advent of cystitis. In this stage the urine is still acid, the specific gravity still high, and pus is not present in any quantity. The second stage, or that of cystitis, "In common with all forms of chronic ulceration or necrosis of the vesical mucous membrane, the 'solitary' ulcer shows a marked tendency to become encrusted with phosphate of lime upon the supervention of cystitis." The third stage, in which "the mucous membrane has become more or less destroyed, but the areas affected have become skinned over. The bladder is a mere inelastic bag capable of holding an ounce or so."

I am inclined to take issue with Fenwick on this classification, as tending to obscure rather than to clarify our knowledge. It is quite possible that certain simple ulcers develop such a life history—indeed, one would think, *a priori*, that every simple ulcer which runs a chronic course would tend to act as a foreign body in the bladder and as such to favor infection of the bladder urine, and thus lead to Fenwick's so-called second and third stages.

Has anyone ever followed a simple ulcer in its development through such stages? Fenwick speaks of his Case III as having the first stage for seven years and then recovering after perineal section and scraping of the ulcer.

My experience with patients presenting the pathologic pictures of his second and third stages is that they always present an infected urine, and if we are to adhere to our definition of simple ulcer as one whose cause is unknown, we must exclude all cases carrying infection. Even should the pathologic picture of general cystitis show in addition

[1] British Med. Jour., 1896, vol. i, p. 1133.

a solitary, incrusted ulcer in any portion of the wall, the inference is that the entire process began with the infection, unless we have seen the patient before with a solitary ulcer and without the infection.

Buerger[1] classifies with his cases of simple callous ulcer one in which the bladder symptoms began during pregnancy and in which the bladder urine gave a culture of staphylococcus albus. Such a case, regardless of what the cystoscopic picture may show, certainly fails to correspond to the generally accepted definition of simple ulcer.

Le Fur in his exhaustive monograph[2] properly states that simple chronic ulcer of the vesical mucosa does not always present as a round ulcer with thickened callous edges simulating ulcer of the stomach, but that they may offer very irregular forms or special aspects. He holds that they may be so small and superficial as to be called microscopic or histologic ulcers as contrasted with the usual macroscopic ulcer.

Unfortunately he illustrates this latter point by referring (p. 205) to some of his results in animal experimentation, where histologic ulcers were caused after inoculation of the blood with organisms and then injuring the bladder wall. Such conditions might conceivably result in simple ulcer, but the finding of small fresh lesions in a recently inoculated animal would not furnish the proof.

Diagnosis. So far as I know there is no form of bladder inflammation or ulceration that has an absolutely characteristic clinical history or cystoscopic picture. The ulcer under discussion is no exception to the rule.

The patient's recital of the insiduous onset without apparent antecedent cause, and the long duration in spite of various forms of treatment, make one think at once of

[1] Pathology and Treatment of Callous Ulcer of the Bladder, Medical Record, April 12, 1913.

[2] Des ulcérations vésicales et en particulier de l'ulcère simple de la vessie, 1901, Paris, G. Steinheil.

tuberculous disease. This is excluded as soon as one finds macroscopically clear urine associated with such a long history, and absence of any sign of disease of the kidney or ureter.

One sometimes gets a history of serious symptoms simulating cystitis from patients suffering with chronic urethritis. As stated above, these cases under discussion have all had signs of chronic urethritis, but the presence of microscopic pus or blood or of both in urine catheterized from women makes one certain that he is dealing with something more than a urethritis.

There is nothing absolutely characteristic in the cystoscopic picture. Perhaps the most characteristic thing is the insignificance of the lesion as compared with the long duration and intensity of the patient's suffering. As stated above, one's attention may first be arrested by the slight, smooth, white scars of former ulceration rather than by the slight hyperemia or inflammatory spots near these scars. In other cases there is a small granulation area which is bleeding from the distention of the bladder or bleeds easily on being touched. In other cases or at other examinations of the same case the inflammatory spot is occupied and surrounded by an area of edema. Any one familiar with bladder work has seen slight lesions similar in appearance to these under discussion, and has seen them clear up spontaneously or after a few instillations of some antiseptic drug. Such slight lesions are generally accompanied by infection and the healing depends upon ridding the bladder of infection. In gonorrheal infections this takes place spontaneously in a few weeks, or much sooner if the bladder is treated.

Our conclusion therefore is that a diagnosis of this peculiar form of bladder ulceration depends ultimately on its resistance to all ordinary forms of treatment.

The difficulty of diagnosis in this class of cases, unless we are awake to their unusual features, is best illustrated by the fact that four of the eight cases had operations on other

organs in the effort to relieve symptoms caused by the bladder ulcer.

Microscopically one finds in the resected portion of the bladder wall a typical picture of chronic, simple ulcer. The epithelial layer is absent at the site of the ulcer and the mucosa layer is occupied by typical, chronic, granulation tissue. In some of the specimens this granulation tissue is fairly richly supplied with capillaries, but in most of them there is a preponderance of connective tissue and infiltration of small round cells and leukocytes.

The epithelium surface in the neighborhood of the ulcer shows multiple layers of the transitional type of cells, the external layers being of the squamous stratified type and in places appearing hornified. Next to the ulcer the epithelial layer may end abruptly with a precipitous edge, or there may be seen extending beyond this abrupt edge an attempt at repair in the nature of a single layer of cuboidal cells growing toward the bare surface of the ulcer. In Case III there occur many of the so-called glands of the bladder lined with goblet cells (see Fig. 1).

The mucosa layer in the neighborhood of the ulcer shows an increase in the number and size of the capillaries varying in the different specimens. The capillaries are often stuffed with leukocytes as are many of the lymph spaces. There are some enlarged lymph spaces crowded with lymphoid cells and leukocytes, and where these are seen lying beneath the normal epithelium near the ulcer, they at first suggest the picture of tubercle (see Fig. 2, *d'*).

There is hyalin degeneration in some areas and in some of the sections the edema causes rarification.

Some of the specimens show considerable non-striated muscle in the mucosa coat in the neighborhood of the ulcers.

The muscle coat shows enlarged lymph spaces and these as well as some of the bloodvessels of the muscle coat contain many leukocytes. Immediately beneath the ulcer the muscle in places shows invasion and breaking up by the

inflammatory process. The peritoneum, which in Case III was thickened and torn at the time of operation, shows microscopically a fibrous thickening and in the tissues a few wandering leukocytes.

Treatment and Results. It will be seen by reference to the histories that of these eight cases five have had excision of the diseased area, with probable perfect result in all but one, Case V. Of the three unoperated cases I have treated Case II six years with apparent healing on two or three occasions. Case VIII has been treated about eight months with improvement in the symptoms but with little change in the appearance of the bladder lesion. Case IV is now being treated by Dr. John Caulk, of St. Louis, her symptoms having improved, but the lesion persisting after four months of rather desultory treatment under my directions during the past summer.

My experience with this relatively small number of cases convinces me that excision is the treatment after one arrives at a diagnosis of this particular form of ulcer.

As stated under the discussion on diagnosis I would not arrive at a final diagnosis calling for operation unless the patient has had systematic local treatment for the bladder symptoms and presents in addition the signs and symptoms above enumerated as more or less characteristic.

The excision is done through a suprapubic extraperitoneal incision. To facilitate the finding and handling of the bladder it is left full of air if cystoscopy has just been done in the knee-breast posture, or it is distended with sterile fluid just before operation.

If the peritoneum is involved in the inflammatory process and is accidentally torn in peeling it from the muscle wall it is sutured at once before opening the bladder.

The incision in the bladder wall is made with a view to open near but not into the inflammatory area.

In my first cases I was interested in palpating the ulcers with bare fingers, but this is not necessary and tends to change

the microscopic picture. The inflammatory area is easily found by vision, and by doubling it back over the fingers on the outside or muscle wall it can be excised with all layers of the bladder wall without touching the mucosa layer of the inflammatory area. As soon as removed the specimen should be pinned to a stiff card-board before passing it to the preservative fluid, otherwise it quickly shrinks and mars the microscopic study.

The few bloodvessels of consequence should be grasped with forceps, and after the excision they should be tied with fine (No. 1) twenty-day catgut, otherwise they may retract into the muscle wall and temporarily cease to bleed, only to give trouble during the first few days of convalescence, as happened in Case III.

The bladder edges are quickly brought together by a running lock-stitch suture of either ten or twenty-day, No. 2 catgut, leaving a slight opening in the vertex through which the mushroom retention catheter is carried and sutured to the bladder wall with a No. 2, ten-day catgut. The abdominal wall is closed except for a small opening to carry the rubber catheter and a cigarette drain, which is introduced down to the bladder wall.

This cigarette drain is removed at the end of forty-eight hours and daily irrigations of the bladder with 1 to 10,000 solution of silver nitrate are carried on through the retention catheter, increasing the strength of the solution as the patient recovers. An ounce or two of the solution is introduced and immediately withdrawn through the catheter until several washings are made. This is best accomplished with the patient on her side.

The retention catheter is withdrawn on the tenth to the fourteenth day, after which the irrigations are given through the urethra daily until the bladder is free from infection.

DISCUSSION

Dr. Howard A. Kelly, Baltimore.—Mr. President: I am exceedingly interested in these cases. I had a patient from Pittsburgh who suffered a good many years with intense urinary symptoms, and found a large ulcer, as Dr. Hunner described, just at the vertex of the bladder, and a wide excision gave immediate relief. The characteristic thing about the ulcer was intense infiltration of the surrounding tissues and the thickened almost parchment-like tough condition of the ulcer. It was an old affair.

Dr. Hunner.—Could you make it out through the cystoscope?

Dr. Kelly.—Yes, I saw it, mapped it out, and then did a suprapubic operation, taking out an area of about 3 cm. in diameter. The operation was done some twelve years ago, and the patient has been well ever since.

One point as to sewing up the bladder. In approaching the bladder disturb as little as possible the investing cellular tissue; leave it intact, for it is the best asset in sewing up the bladder. If you do not rub it off or disturb it, you can get a good grip on it with sutures and thus bring the bladder walls neatly and snugly together.

Dr. Thomas S. Cullen, Baltimore.—I have had the opportunity of studying the drawings that have been made for Dr. Hunner by Mr. Brödel and also of examining the sections with him. It is interesting to see the depth to which the inflammation extends. There is not a shadow of a doubt, viewing it from a pathologist's standpoint, that it is an active ulceration. Most of these chronic cases show typical granulation tissue in the centre. This gradually shades off into normal tissue on the side. As Dr. Hunner has pointed out, there is a certain amount of infiltration beneath the epithelium. That is natural. Nature has been trying to heal the defect and the surface has been skinned over just as one would note in a leg ulcer. In one of Dr. Hunner's cases the inflammatory process extended almost to the outer surface. I think it is but natural that these ulcers do not heal readily. They are subjected to the continual stretching and contraction of the bladder; consequently it is but natural that the healing process is an unsatisfactory one.

In this connection I would like to speak about the edema.

Where you have inflammation and irritation associated with it, you are bound to have edema, and I think when Dr. Hunner examines his cases further he will find that in the majority of them the inflammation extends almost to the edge of the edematous area. That will account for the little edematous areas being left and the trouble still persisting.

I would like to refer to a case which is not exactly to the point, but I wish if possible to get a little information from the Society. Professor Halsted, knowing that I was interested in diseases of the urachus, asked me to see a small boy with a tumor between the symphysis and the umbilicus. Situated in the midline and reaching almost to the umbilicus was a hard globular tumor at least 6 or 7 cm. in diameter. This tumor diminished very little in size when the bladder was emptied. Thinking we were dealing with a urachal tumor I made a median incision and found what proved to be a markedly and uniformly thickened bladder.

The bladder walls varied from about 1.5 cm. to 2.5 cm. in thickness. On histological examination the great thickening was in part due to hypertrophy of the bladder musculature, but in a large measure to a diffuse and abundant growth of nerves. I would like to know if any of the members have ever seen a vesical thickening of this character.

We are deeply indebted to Dr. Hunner for drawing our attention to this interesting class of bladder ulcer. It will help us to cure a certain number of those cases of vesical irritability that have not been understood by us in the past.

Dr. Bransford Lewis, St. Louis, Missouri.—There is one plan of treatment for simple ulcers of the bladder from which considerable was expected, and that is the use of fulguration, or high-frequency electricity, applied to ulcers through an insulated wire passed through the cystoscope, but for this particular purpose fulguration has not proved satisfactory.

I have used it with assiduous devotion in several cases of these ulcers, and have found them exceedingly rebellious from every standpoint. In one case, in the first month or so, I was felicitating myself that I had obtained an excellent effect; that the ulcer grew smaller or became reduced considerably in size, and I was gratified over the progress of the case, but later the ulcer became as bad as ever. It seems that excision of the ulcer is the most satisfactory plan to carry out.

Dr. Hunner (closing the discussion).—In reference to the remarks just made by Dr. Lewis, I will say that I used fulgura-

tion only twice in two different cases, and each time the patient was so much worse with pain that she refused to have it again. These ulcers are exceedingly painful. The encrusted ulcer, on being touched, does not give the amount of pain that these ulcers do. Buerger reported success with fulguration in one case characterized by excessive bleeding, but in this case the ulcer must have been superficial, as with later attempts in his "simple callous ulcer" he was disappointed in the fulguration method.

I have used the actual cautery with success in a few cases of old ulcer where, after getting rid of the general cystitis, a chronic ulcer was left, and in these cases I have been pleased with the use of the actual cautery wire after failure with local applications of pure carbolic acid or silver stick.

As to the question of healing in any ulcer, we need to do something that will get at the base of the ulcer, and there is some danger of the actual cautery wire going too far. That is the only thing we have to be careful about.

Those cases Dr. Kelly spoke of, as coming to us with intense general congestion and special areas of ulceration, ordinarily have infection. They have colon bacillus or some type of infection when they come to us, and we can get rid of the general congestion and even the infection itself, and still have this residual ulcer, as Dr. Kelly said. That type of ulcer, of course, is rather different from these under discussion, and none of my cases had any associated infection.

As to the sewing up of the bladder: The first thing, before going in suprapubically, is to distend the bladder with air or by some fluid to mark it out nicely; then when I go in suprapubically and extraperitoneally, the first thing I do is to peel the peritoneum away from the whole vertex unless the ulcer happens to be next to the symphysis, then I do not peel away the peritoneum because there is room enough for the incision without disturbing the peritoneum. With the peritoneum peeled away you have no trouble in excising all thicknesses of the bladder wall. Then it proves a simple matter to close the bladder. I take a strand of either twenty-day or No. 2 ordinary ten-day catgut and make a running lock-stitch suture. The only thing you need to be careful about is to be sure that the patient does not have a postoperative hemorrhage. The running stitch brings the walls together snugly, but the larger vessels should first be tied separately. I leave a slight opening

to carry through a retention catheter. In two cases I sewed the retention catheter to the bladder wall and then to the skin. I do not recommend that. You can sew the retention catheter to the bladder wall, but it should not be hung up by a stitch to the skin, but should be given a chance to slide up and down with the bladder. Irrigations are kept up for ten to fourteen days and the retention catheter then slipped out. The patient does not leak more than a day or two, and irrigations are kept up through the urethra until you get rid of infection.

PERINEPHRITIC ABSCESS: A REVIEW OF CASES OPERATED ON AT THE MASSACHUSETTS GENERAL HOSPITAL FROM 1899 TO 1913

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This paper is based upon the cases classed as peri- or paranephritic abscess, 59 in number, operated on at the Massachusetts General Hospital during the fifteen years, 1899 to 1913. For permission to report these cases I wish to thank the members of the staff of the hospital who operated on them.* Although perinephritic abscess presents a simple problem purely from the point of view of surgical treatment, yet the etiology is often obscure and the diagnosis in individual cases difficult. It is from the point of view of etiology particularly that I wish to consider the present series.

Included as peri- or paranephritic abscess are cases of varied origin and clinical course. Many factors make the determination of the probable source difficult. The long duration of the disease, the frequent inadvisability of com-

* These cases were operated on by the following present and past members of the staff: Dr. F. G. Balch, Dr. H. H. A. Beach (deceased), Dr. G. W. W. Brewster, Dr. W. A. Brooks, Dr. A. T. Cabot (deceased), Dr. Hugh Cabot, Dr. Farrar Cobb, Dr. E. A. Codman, Dr. W. M. Conant, Dr. Lincoln Davis, Dr. J. W. Elliot, Dr. R. B. Greenough, Dr. F. B. Harrington (deceased), Dr. S. J. Mixter, Dr. J. G. Mumford (deceased), Dr. C. A. Porter, Dr. C. B. Porter, Dr. C. L. Scudder, Dr M. H. Richardson (deceased), Dr. Hugh Williams.

pletely exposing the kidney, the difficulty of determining the focal point in a large abscess cavity, the indefiniteness of clinical symptoms in renal disease limited to the cortex, may tend to obscure the cause of suppuration in any given case. Two large groups of cases may be made: (1) cases in which the suppuration apparently originates in the perirenal fat primarily, and (2) those cases in which it is a continuation of disease from adjacent organs or structures. The latter class of cases may be divided into those secondary to disease of the kidney, and those secondary to disease of other adjacent organs or tissues, particularly the intestinal tract, spine, ribs or pleura.

This fact stands out in the majority of reported series. In many cases, and perhaps the majority, there is no definite local source for suppuration to be found, whether in the kidney or in adjacent organs or structures. It is the etiology of this group of cases, those of concealed origin, that I wish to discuss.

In this group, sometimes called primary cases, we have three possible sources of suppuration: (1) through the lymphatics, (2) through the blood stream by metastatic infection, and (3) from overlooked renal lesions. Trauma may be an important contributing factor, whatever the source of infection, through producing hemorrhage in the fat capsule, or some other point of lowered resistance.

The possible lymphatic origin of perinephric suppuration is obvious. The communication of the lymph vessels of the cortex with those of the perinephric fat through the fibrous capsule, of the ureter with those of the kidney and bladder, the connection of the lymphatics of the perinephric fat with those of the diaphragm, the further connections through the lumbar, iliac, and hypogastric nodes, suggest many possible sources of infection. Stewart,[1] and Sweet and Stewart[2] have shown the great importance of ureteral lymphatics in ascending infections of the kidneys and perinephric tissues. Miller[3] has emphasized the importance of the

anatomical relation of the perinephric fat to the lateral lumbar glands.

There is also evidence, both clinical and experimental, in favor of metastatic infection of and suppuration in the fat capsule through the blood stream. This might take place either directly, through the vessels of the fat capsule itself, or indirectly, through the formation of lesions in the renal cortex or fibrous capsule, with rupture or extension into the perirenal fat.

Bacteria injected into the blood stream of animals in sufficient quantities are excreted in part by the kidneys. This is probably a pathological rather than a purely physiological phenomenon. Brewer[4 5] showed that if the resistance of one kidney was lowered by such factors as trauma or interference with the circulation, septic infection of that kidney might follow the injection of pathogenic bacteria into the blood stream. Injecting the staphylococcus, J. Koch[6] found that the toxins of the bacteria themselves, and Rehn,[7] that a short chloroform anesthesia was sufficient to lower the kidney resistance and permit the occurrence of a septic nephritis with local renal abscess, frequently subcapsular. On account of the lack of a definite fat capsule in animals, such a septic hematogenous nephritis rarely results in perinephric abscess. Schnitzler[8] found that such injection, followed after weeks by trauma, caused perirenal suppuration.

Clinically the occurrence of hematogenous septic nephritis has been brought to general attention by Brewer. It is well to remember, however, that such infection, as well as occurring in the form of fulminating cases demanding nephrectomy, and mild cases subsiding without operation, may produce local abscess of the kidney. Such abscesses are usually cortical, frequently single, and due to the staphylococcus in a great majority of cases. They tend to rupture into the perirenal fat rather than into the pelvis, and through extension may be the source of perirenal abscess. Their

clinical symptoms may be indefinite, and they may produce either no change in the urine or so slight a change that it is overlooked. Consequently it is impossible practically to classify perinephritic abscess cases as renal or non-renal through urinary examination.

As further evidence of the possible metastatic origin of perinephric suppuration, either directly or through the agency of the kidney, we have series of cases of local cortical abscess of the kidney and of perinephric abscess, due to the staphylococcus, following peripheral pus foci, particularly furuncles, carbuncles, and paronychiæ. This association, pointed out by Jordan[9] [10] and Israel[11] has been followed by a series of cases reported by Jáffe,[12] Cahn,[13] W. Albrecht,[14] F. Koch,[15] Herczel,[16] Müller,[17] Rehn,[7] Coenen,[18] Baum,[19] Hartzbecker,[20] Zinn,[21] Schnitzler,[22] Friedman,[23] and others. These authors agree that in such cases infection is metastatic through the blood stream, and that perirenal suppuration may be due to the rupture of a preceding cortical abscess. In this partial review of literature, 108 cases are reported due to metastatic infection. In 9 of them the abscess was limited to the renal cortex, in 24 the perinephritic abscess was apparently extension of a cortical renal abscess, in the remainder the source of suppuration was not demonstrable at operation. In these cases, perirenal suppuration was preceded by furuncles 55 times, by paronychiæ or septic finger 21 times, by carbuncles 10 times, by various local abscesses 11 times, by tonsillitis and septic wounds, each 3 times. In 21 cases showing ruptured or non-ruptured cortical abscess the urine was stated to be negative 12 times. The usual infecting organism was the staphylococcus, occurring 32 times alone, once each with the streptococcus and the colon bacillus. The streptococcus occurred twice.

Rehn believes his experiments show the genesis of perirenal abscess in two ways: (1) through primary cortical metastasis, with wandering of virulent organisms through the fibrous capsule, and destruction of the same, and (2)

through primary metastasis in the fibrous capsule itself, and that these results are fully applicable to man.

Now what evidence in favor of metastatic hematogenous infection do the present series of 59 cases present? For the purpose of this paper the cases may be divided roughly into three groups: First, cases which are due to direct extension of suppuration from neighboring organs or structures outside the renal fascia; in this group are 5 cases, 2 men and 3 women, with 2 deaths. Infection here was due to tubercular abscess, apparently pancreatic (death), to acute abdominal sepsis in a woman seven months pregnant (death), to retroperitoneal abscess following gangrenous appendicitis, to tuberculosis of the spine, and to disease of the twelfth rib. These cases are properly classed as retroperitoneal or lumbar abscess, and need not concern us further.

In the second group are included cases with antecedent or predominant disease of the kidney or urinary tract, excluding a past urethritis without sequelæ, a total of 20 cases, 16 males and 4 females, with 4 deaths. Tuberculosis of the kidney occurred four times with 1 death, one secondary nephrotomy and two secondary nephrectomies. Pyelonephritis, apparently non-tubercular, occurred three times, with one primary and two secondary nephrectomies. Pyonephrosis was present three times, twice with stone, with two deaths. Divulsion of stricture of the urethra was followed by perinephric abscess in 1 case. In 1 case there were calculi and diverticula of the bladder, with deficient excretion from the kidney on the affected side. Three cases gave a history of repeated attacks of renal colic, and had passed stones by the urethra. In one of these, nephrotomy and exploration of the other kidney through the wound was followed by death. One case showed stone by the *x*-ray, but the kidney was not exposed at operation. In 4 cases the kidney was stated to feel diseased at operation, but particulars were not given.

In some of these cases, suppuration was obviously due to

direct extension from the kidney. In others, although the exact method of development is obscure, there is at any rate the possibility that the perinephric infection was dependent upon the condition of the kidney or urinary tract. Although these constitute an important group of cases, for the purpose of this paper they need not be discussed further.

After separating the above rough groups, 34 cases remain. This last group, many cases of which would formerly be classed as "primary," I wish to discuss more in detail, and will limit my remarks from here on to this group. Their common factor is, in general, absence of symptoms referable to the urinary tract. It is obvious that they may develop from infection brought from a distance by the lymphatics. What evidence is there of metastatic infection through the blood?

This group includes 33 males and 1 female. All cases recovered from operation. Their average age was twenty-nine, the youngest was twelve, and the oldest was fifty-six; 29 of them were under forty. Arranged by decades, the ages occurred as follows:

From 10 to 20 years	. . . . .	8 cases.
" 21 to 30 "	. . . . .	13 "
" 31 to 40 "	. . . . .	8 "
" 41 to 50 "	. . . . .	3 "
" 51 to 60 "	. . . . .	2 "
		34

The pus was examined bacteriologically in 21 cases. Thirteen cases showed Staphylococcus aureus, 3 a staphylococcus, 1 each the streptococcus in mixed culture, the Bacillus coli, an unidentified bacillus, and no growth. One case, with preëxisting sinus, showed a streptococcus. If the infection were commonly from an intestinal source, we should not expect such a predominance of the staphylococcus in pure culture.

A few cases showed a possible source of infection in peripheral suppurating focus. The following case is an example:

History. Male, aged thirty-three years, No. 181686; admitted March 21, 1912. Denies venereal infection. Three weeks ago had lymphangitis of left arm following cut on wrist. Twelve days ago slipped from a tree and "strained" left side. Four days later began to notice dull, heavy pain in left flank. No definite chill. No disturbance of urination. Has been in bed two days. No vomiting. Has walked lame since pain has been present.

Physical Examination.—Left thigh drawn up; abdomen soft; no costovertebral tenderness. Marked tenderness along lower border of ribs extending into left lower quadrant just above Poupart's. No mass felt.

On left wrist a linear scar one inch long. Just posterior to this are two furuncles, one discharging.

Urine examination: Faint trace of albumin; a few leukocytes and red blood corpuscles. White count 21 to 300.

Seen by Dr. Codman, and condition regarded as acute hematogenous kidney. No operation advised.

March 26. Blood culture negative. Temperature runs between 99° and 102°.

March 29. Tenderness in flank increasing.

April 1. Operation by Dr. C. L. Scudder. Loin incision, opening abscess in kidney region containing non-offensive creamy pus. Kidney not seen or felt.

Culture from pus, profuse growth of staphylococci.

Blood culture, April 3, no growth.

Urine entirely negative on eight examinations following first.

Good convalescence.

April 18. Discharged.

A second case, a boy of fifteen, was confined to the house six weeks before entrance by furunculosis. Two weeks later pain in the back developed, and five days ago a swelling in the right loin. The urine was negative on examination. Operation by Dr. G. W. W. Brewster showed a large abscess posterior to the kidney, containing odorless pus, which on culture showed a staphylococcus.

In a third case, pain in the back was stated to have come on eight weeks before admission, coincidently with boils of the head and neck. Operation by Dr. C. L. Scudder showed a small abscess outside of the kidney capsule. On culture the Staphylococcus aureus was found.

The first two of these cases distinctly suggest a metastatic source of infection. The record in the last case does not show any lapse of time between the furunculosis and the onset of pain.

Two cases followed by erysipelas (facial in one instance, not stated in the other) and one case of streptococcus infection of the shoulder-joint. In all three of these cases, however, the staphylococcus was found in the perinephric abscess. In one case, lumbar pain followed a week after sore throat and cervical adenitis. One case followed influenza, and one a bronchitis. No other infectious processes occurring within three months were mentioned. In spite of the frequency of suppurative lesions draining into the lymphatics in the neighborhood of the fat capsule, they have not been conspicuous in this group.

Trauma has not been conspicuous in this series, and was definite only in one other case, a fall on the back from a table.

It is impossible to state from the records to what extent cortical abscess of the kidney may have been responsible for perirenal suppuration in this group. One case showed an induration the size of a dime on the cortex, with a dimple and a superficial sinus in the centre. This lesion distinctly suggests a cortical abscess, largely healed. This case is the only one of the 34 in which the kidney was completely exposed. In only 12 others, was it recorded as felt in its relation to the abscess cavity.

The following two cases of cortical renal abscess, not included in this series, suggest that perirenal suppuration may have been headed off by early operation. One, operated on the fourth day by Dr. Daniel Fiske Jones, showed abscess in the lower pole, about to extend into the perirenal fat.

The other, operated on the fifteenth day by Dr. Lincoln Davis, showed a solitary abscess under the fibrous capsule. Both were due to staphylococcus. In the second case, the urine was entirely negative. Both cases report themselves well, ten and three years after operation.

Only 12 of the 34 cases showed an entirely negative urine before operation. Leukocytosis was present in all but 1 of the 34 cases. Blood culture was negative in 6 instances.

The type of onset varied from sudden sharp pain, suggesting in a few cases renal colic, to an insidious onset, in which the presence of a lumbar mass first called attention to the probable diagnosis. In 7 cases the onset was distinctly sudden, in 2 cases with an initial chill. Occasionally, a period of remission followed.

Complications were few. Two cases had phlebitis, one pneumonia and otitis media. One case had a fecal fistula. One case required two operations, and one, three before the sinus finally closed.

Letters sent to these 34 cases gave fifteen replies; 12 cases were well at an average of six years, 2 cases were well at one year, and 1 complained of weakness and bad kidneys at the end of one year.

Diagnosis is difficult in the early stages, and in general it may be said that operation is undertaken late. In this group, excluding 2 cases in which the duration of symptoms was six months, the average duration was twenty-nine days. In 24 cases a palpable mass, often already pointing, was present. Cystoscopy, ureteral catheterization, and *x*-ray, although essential in excluding disease of the urinary tract or spine, may be of no positive help in these cases. The three principle points in diagnosis are continued fever, leukocytosis, and abdominal or costovertebral tenderness. It is certain that the loin does not always receive the careful attention on examination that the anterior abdomen receives, and when found, costovertebral tenderness may not be given the importance that it deserves.

The treatment in general in this series has been simply to drain, reserving further measures for a secondary operation. There were no deaths in the last group of 34 cases. The mortality for 59 cases was 10.2 per cent. There were no deaths from secondary operations.

To sum up, a very few cases show evidence of a metastatic hematogenous infection. Whether this is direct, through metastasis in the fibrous capsule, or through rupture of a cortical abscess, is of small clinical importance, provided that the possible coexistence of an imperfectly drained renal abscess is borne in mind.

In conclusion, without minimizing the importance of infection of the perirenal fat from a distance through the lymphatics, and without implying the frequent participation of the kidney, I should like to call attention to the following points:

The commonest organism, the staphylococcus, producing "primary" perinephritic abscess, is also the most frequent organism concerned in producing focal cortical abscess in the kidney.

"Primary" perinephritic abscess occasionally follows peripheral pus foci, due to staphylococcus infection. In such cases it is reasonable to suppose that infection has followed a metastatic hematogenous course.

A urine normal on clinical examination does not exclude the possibility of cortical renal abscess.

The previous occurrence of a peripheral pus focus may be of some importance in the diagnosis of continued fever with leukocytosis and lumbar or abdominal pain.

Bibliography.

1. Stewart. Univ. Penn. Med. Bull., July and August, 1910.
2. Sweet and Stewart. Surg., Gyn., and Obst., 1914, xviii, 460.
3. Miller. Ann. Surg., 1910, li, 414.
4. Brewer. Surg., Gyn., and Obst., 1906, ii, 485.
5. Brewer. Jour. Amer. Med. Assoc., 1911, lvii, 179.
6. Koch, J. Zeit. f. Hygiene, 1908, lxi, S. 310.

7. Rehn. Beit. z. klin. Chir., 1911, lxxiii, S. 1.
8. Schnitzler. Verh. d. Deutsch. Ges. f. Chir., 1899, S. 553.
9. Jordan. Verh. d. Deutsch. Ges. f. Chir., 1899, Bd. xxviii, S. 140.
10. Jordan. Verh. d. Deutsch. Ges. f. Chir., 1905, Bd. xxxiv, S. 18.
11. Israel. Nierenkrankheiten, Berlin, 1901, ii, 580.
12. Jáffe. Mitt. a. d. Grenzgeb. d. Med. u. Chir., 1902, Bd. ix, Heft 4 und 5.
13. Cahn, A. Münch. med. Woch., 1902, Nr. 19, S. 4777.
14. Albrecht, W. Beit. z. klin. Chir., 1906, Bd. l, Heft 1.
15. Koch, F. Int. Dis., Jena, 1903.
16. Herczel. Int. Med. Cong., Budapest, Sect. f. Chir., 1909, lxxv.
17. Müller. Deut. mil. Zeit., 1910, xxxix, Heft 21, S. 809.
18. Coenen. Berl. klin. Woch., 1911, xlviii, 499.
19. Baum. Cent. f. Chir., 1911, xxxviii, Bd. ii, 956.
20. Hartzbecker. Arch. f. klin. Chir., 1912, Bd. 98, S. 957.
21. Zinn. Terapie d. Gegen., 1912, liii, Heft 4, S. 145.
22. Schnitzler. Wien. med. Woch., 1913, p. 2551.
23. Friedman. Zeit. f. Urol. Chir., 1914, iii, 61.

DISCUSSION

Dr. Thomas S. Cullen, Baltimore.—I hesitate to speak on this subject when there are so many men present who have had a much larger experience than I. However, there are one or two cases I would like to refer to. One was an old practitioner of medicine who complained of pain in the left side. I evacuated a large quantity of pus from the region of the left kidney. He improved for a time but the discharge continued. He died several months later and at autopsy we found a primary carcinoma of the stomach with extension to the duodenum and colon. The colon had ruptured and it was in that way that infection had caused the left perinephritic abscess.

I have recently operated on a man supposed to have an enlarged spleen. The symptoms were not definite. We made an incision through the left rectus and found an abscess situated posterior to the splenic flexure of the colon. It was impossible to get at it from the renal region, consequently we went through the mesentery of the colon, and, after carefully walling off, evacuated an abscess containing 700 or 800 c.c of pus. This was sterile. There was no relation whatever to the kidney, but it was in the renal region.

Several years ago I operated upon a case that is of some interest from the stand-point of treatment of perinephritic abscess. The patient entered the Johns Hopkins Hospital

with a definite perinephritic abscess on the right side. The abscess was evacuated within forty-eight hours, the patient complained of sudden pain along the right side of the abdomen and there was apparently a commencing general peritonitis. I immediately sent the woman to the operating room and made a right rectus incision. I found that the wall between the abscess sac and peritoneal cavity was exceedingly thin and that the inflammation had travelled through the partition causing a commencing peritonitis on the right side. We carefully wiped off the peritoneum, walled off the area bringing several drains out through the rectus incision. The symptoms of peritonitis promptly subsided and the patient made a good recovery.

Dr. Francis R. Hagner, Washington, D. C.—I wish to relate a case that came under my observation, of a boy who had furunculosis of the back, and about three weeks later developed a perinephritic abscess. He was operated, the abscess evacuated, and a pure culture of the staphylococcus found. We stopped packing the wound. Two weeks later a fecal fistula developed; we then of course obtained a colon on culture. He left the hospital with the fistula, the case was lost sight of and I do not know the ultimate result.

Dr. J. M. Mason, Birmingham, Alabama.—This subject brings up the importance of thoroughly cleaning up and curing superficial boils and carbuncles to prevent the development of hematogenous infection with metastases. Whether infarction of the kidney plays a great part in the formation of perinephritic abscess is open to discussion as the author suggested. That view is entertained in many quarters, and hematogenous infections, cortical abscesses, or septic infarcts, are responsible for a certain number of cases of perinephritic abscess. Cortical or superficial septic infarcts of the kidney may give no symptoms whatever referable to the urinary tract, because they may be outside of the capsule of Bowman, and may point and rupture underneath the fatty capsule. Some of these cases, however, even when not associated with colonic infection or perforation, must be hematogenous, as Dr. Richardson points out, because in a certain number of cases there are large abscesses around the kidney without involvement of the kidney at all. I had such a case not long ago where we were not able to trace the origin of the trouble. The patient came into the hospital with a well-defined abscess in that region. We thought the disease was probably of colonic origin.

A small series of cases of septic infarcts of the kidney I reported at the meeting, held at Old Point Comfort, two years ago. One of them particularly followed a carbuncle on the back of the neck. I traced that case eighteen months before the kidney became involved. It shows the necessity of absolutely eradicating pus infections that start in the superficial skin either in the nature of a carbuncle or an abscess.

Dr. Kirkland Ruffin, Norfolk, Virginia.—I had a case a few years ago of a young physician who, when he came under my care, evidently had an abscess in the lumbar region. I at once operated and found a large perinephritic abscess. Examination of the contents of this abscess showed practically a pure culture of the gonococcus. The man had been feeling badly for two or three months. He had an irregular temperature, but the climax was rather sudden. Going back over his history we found that two and a half or three years before that he had had what he considered a mild gonorrhea, which he treated himself, and thought it was limited to the anterior urethra. He had no discharge nor any shreds or any trouble after two or three weeks. It was three years later that he developed this perinephritic abscess. He had had in the meantime no symptoms. After operating upon his kidney abscess and draining it, about two weeks later he developed trouble in his prostate, and I had to drain a peri-prostatic abscess.

We have also had metastatic infection of the kidney from a large carbuncle which had been neglected some time before we saw the patient. After total excision of the carbuncle the neck finally healed. A week or more after leaving the hospital, and probably six weeks after operating for the carbuncle, the patient developed signs of pus kidney. After removing the kidney it strongly resembled in appearance the necrotic state of the original carbuncle.

Dr. W. P. Carr, Washington, D. C.—Some of the perinephritic abscesses, after being opened and drained, do not do well. I have had four or five cases, and I will briefly relate one to show what I mean.

This patient, a boy, had a large perinephritic abscess, which was opened through loin and drained. It contained probably half a gallon of pus. He was feeble, and while his pulse and temperature became nearly normal, the wound would not heal. In this case the infection was due to the staphylococcus aureus. I treated him with stock vaccines. This did no good. The

case ran along for, I think, two months. The wound became gelatinous and kept spreading, and breaking out in new places. It crept down nearly to the root of the penis, a small abscess forming and breaking through the skin. I then had an autogenous vaccine made, and after one injection there was no more pus, and the gelatinous condition of the wound ceased immediately. In a very few days after injection of the autogenous vaccine the boy was practically well.

I have had a similar experience with other cases of perinephritis abscess, and with abscesses in other parts of the body. I think where a staphylococcus aureus infection is found, autogenous vaccine is a specific. The results are often remarkable. For the last year or two I have made it a habit to start an autogenous vaccine from every pus case I get, even appendix cases, because some of them will not do well when opened and drained and the offending body removed. It is a good plan, I have found, to have the autogenous vaccine started at once, even if we do not use it more than once in a hundred cases. When we do want it, we want it quickly.

Dr. Richardson (closing the discussion).—It seems more than a clinical coincidence that this suppuration around the kidney follows such lesions as furuncle or carbuncle. Whatever the relation of the kidney may be to such cases of perinephric suppuration, it is at least worth while to look at them from the point of view suggested by septic hematogenous infection or bacterial congestion of the kidney.

THORACOTOMY IN UNRESOLVED PNEUMONIA

By Randolph Winslow, M.D.
Baltimore, Maryland

As a result of accident, and more or less of mistaken diagnosis, I have had two experiences that have been of such interest to me that I wish to present the details of the cases to you, for your consideration and criticism.

Case I.—Several years ago a boy sixteen years of age was brought from the country to the University Hospital, Baltimore. He had had an attack of acute lobar pneumonia, but his symptoms did not cease and he was brought to the city for treatment. He was running a high and irregular temperature and had such physical and other signs that it was thought he must have empyema. Aspiration, however, failed to locate pus. As he did not improve under treatment it was thought he must have an encapsulated collection of pus within the pleural cavity and a thoracotomy was decided on. Under gas and oxygen anesthesia the chest was opened but no purulent collection could be found; the lung was hard, non-collapsible and with adhesions to the chest wall. The adhesions were broken up and a drainage tube placed in the pleural cavity for a few days. Almost immediately there was a marked amelioration of his symptoms; the temperature fell to normal and in a short time he was convalescent.

Case II.—Mr. S., aged thirty-four years, entered University Hospital on January 7, 1914. He was suffering with a suppurating lump in his left groin and desired its removal.

This lump had been present two years, was not painful, but had suppurated and had been incised several times. He had no gonorrheal infection or other genital lesion and the swelling was thought to be tuberculous and so proved to be on removal. At this time his pulse and temperature were normal, the leukocyte count 8200, and hemoglobin 95 per cent.

On January 8, 1914, a complete removal of the glands was done under ether anesthesia. Following the operation, he did well for several days and then was taken with severe pain in the thorax, with friction murmur on the left side indicating pleurisy, and gradual consolidation of the lung as shown by pectoriloquy, bronchophony, cough, expectoration and the usual signs of pneumonia. His temperature was irregular varying from normal to 105° F., with chills and sweats, pulse 120 to 140 per minute. On January 26 there was a leukocytosis of 23,600. No malarial parasites could be found. It was feared that he had pyemia. Aspiration failed to find any collection of pus but as his symptoms continued without improvement it was determined to explore the left pleural cavity. This was done on February 14, under nitrous oxide and oxygen anesthesia. No pus was found, but the hard and consolidated lung was extensively adherent to the chest wall. These adhesions were broken up and tube drainage instituted. In a few days there was an improvement in his condition and on March 4 his temperature became normal. On March 14 he left the hospital for his home in North Carolina, and soon was able to resume his work.

In cases of acute croupous pneumonia resolution ought to occur about the tenth day, when the temperature drops and convalescence begins. When the temperature remains elevated and irregular after this period it is a cause of great apprehension. It may mean acute tuberculosis but usually it indicates empyema. In such conditions it is proper to aspirate the chest and seek to locate the pus, but even if we

do not find pus I think the pleural cavity should be opened and explored and drainage tubes inserted.

This was the treatment adopted in the cases reported after ample time had been given for a spontaneous recovery.

Whether the improvement in these two cases was merely a coincidence, and not a sequence, of the treatment I do not know, but I do know that they were progressing unfavorably before the operation and speedily became convalescent after it. Whether the improvement was due to the loosening of the adhesions or to drainage of the pleural sac, though there was nothing to drain, I do not know. We know that improvement and cure follows the injection of gases and air in some cases of tuberculosis. May it not be that the benefit observed in these cases of unresolved pneumonia was due to the entrance of air into the pleural cavity causing increased atmospheric pressure on the lung?

DISCUSSION

Dr. Henry O. Marcy, Boston.—As a veteran, I think I can talk about apparatus of the earlier type. I was assistant to Henry I. Bowditch almost immediately after the war. He did no surgery. He called attention to a young man then in Harvard College who, he said, for four years had carried a drainage tube up here in front (indicating) where he made an opening, and why I do not know, and it was connected with a rubber tube into a bottle which he carried in his pocket. The young man was suffering. He belonged to one of the most distinguished families in Massachusetts and the doctor was more than ordinarily interested in him. Dr. Bowditch said to me, "Dr. Marcy, you should know enough to do something for that young man." The chest wall could not contract; the lung could not expand, and there was this cavity causing trouble. That is why I report the case, because I am sure from the doctor's statement it was a pretty early experience in this sort of work. We cut out a section of the ribs—two or three if I remember correctly—and then opened posteriorly, and with some hesitation, on my part I took a double wisp

of horse-hair, tied in the middle, and brought it in through this point here (indicating) and out externally in the lower opening, allowing the ends to spread where they would in the respiratory process. I tried that and it proved to be an admirable idea, because it kept up constant irrigation of the pleura and helped to drain the whole side. He carried that drainage for, as I remember it, not many weeks until it ceased. He began to improve and pretty soon took on flesh, is well today, and belongs to the Democracy which is ruling affairs in Washington.

I would like to ask Dr. Winslow whether he has looked up the history of the matter.

Dr. Winslow (closing the discussion).—Dr. Marcy has asked me if I have looked up the history of the matter. I have not. I have not investigated it at all. As these two cases happened to come in my experience, it occurred to me it might be worth while to report them and get the opinions of others. Certainly, these two cases, after going on at an extremely unfavorable rate, became almost immediately favorable and promising following operation.

Dr. Carr.—Did you open the lung?

Dr. Winslow.—No. I put my hand inside the chest and separated the adhesions, but whether it was a good or bad thing to do, I do not know.

MASSIVE UMBILICAL AND VENTRAL HERNIAS

By Alexius McGlannan, M.D.
Baltimore, Maryland

We distinguish as massive those hernias having a ring of not less than 40 cm. circumference, or a capacity of 500 c.c., also smaller hernias occuring in obese individuals whose pendulous abdominal walls require the removal of an area of skin and fat not less than 10 cm. in its short diameter.

These massive hernias present a problem much more complicated than that associated with simple inguinal hernia. Not only are the technical details of the operations difficult in execution but the mortality and morbidity incident to these operations are greater than in the ordinary forms of hernia. For example, in a series of 1900 non-strangulated inguinal hernias there were but 4 deaths, a mortality rate of a little over 0.2 per cent., while in a series of 197 umbilical and ventral hernias operated on by the same group of surgeons during the same period of time there were 6 deaths, about 3 per cent. In this latter series there were 46 massive hernias with 3 deaths, about 6 per cent.

When strangulation complicates the condition the mortality rate in the massive hernias reaches nearly 50 per cent., as against 26 per cent. in all other forms.

The series of 26 cases which form the basis of this report are from the surgical clinic of St. Agnes' Hospital and from my service at the Mercy Hospital, Baltimore. In this series there were 4 strangulated hernias. Two of these patients died. Of the remaining 22 non-strangulated cases one

patient died on the second day from dilatation of the heart. Sixteen patients were handicapped by lesions other than the hernia; 6 heart lesions, 6 renal, 2 arteriosclerosis, 2 obesity.

The average duration of confinement to bed after operation for inguinal hernia is twelve days, and the stay in the hospital nineteen days. After massive hernia the average is thirty-one days in bed, and forty-eight days in the hospital the extremes varying between twenty-one and one hundred and twenty-five days.

The causes of death in the massive hernias fall into three groups: (1) Those due to cardio-vascular-renal conditions; dilatation of the heart, apoplexy, uremia, pulmonary edema, embolism and thrombosis. (2) Post-operative abdominal conditions; post-operative obstruction, acute dilatation of the stomach, peritonitis, suppuration of the abdominal wall. (3) Those due to the strangulation; toxemia of obstruction, peritonitis from ruptured and gangrenous bowel, embolism of the mesenteric arteries.

The prompt recognition and treatment of the post-operative complication may avert the fatal outcome. Those mentioned in the first group may in many cases be prevented by careful preparation, while the complications due to strangulation occasionally may be handled in such a way as to avoid disaster.

With non-strangulated hernias, acute cardiac dilatation is the most common fatal complication. The danger of its occurrence has long been recognized and various explanations of its cause as well as methods for its prevention have been urged. With these large hernias the patients carry a considerable portion of the abdominal viscera outside the normal confines of this cavity. There is consequent loss of pressure on the large splanchnic vessels resulting in their dilatation and associated with compensatory changes in the general circulation which sustain the normal blood-pressure.

The return of the protruded viscera to the cavity and tight closure of the hernial opening, requires a readjustment of the circulatory balance and thereby throws a great burden on the heart muscle. Should this burden be imposed suddenly, and especially if it be imposed on a heart weakened by myocarditis, a rapid and fatal dilatation is almost certain to follow.

Kidney insufficiency is a frequent complication of these large hernias. As a rule, the kidney lesion is a chronic interstitial nephritis. We have not only the direct result of the renal insufficiency to guard against, but also the vascular hypertension associated with this lesion, which adds to the danger of cardiac exhaustion under the burden imposed on the heart by the alteration of the abdominal pressure.

The other complications of this group are related in cause to these two. Additional strain thrown on an imperfect and unprepared cardiovascular system results in damage either to the heart or vessels. Jaundice and gastro-intestinal hemorrhage, with or without ulceration, are abdominal complications also due to the additional pressure.

Careful pre-operative treatment will reduce the danger from these complications. This preparation may require many days of treatment before the operation can be undertaken. It is rare that a patient suffering from one of these massive hernias is free from some form of cardio-vascular-renal disorder, and therefore if possible the operation should not be done as an emergency procedure. The high mortality in strangulated cases is in part due to urgent demand for immediate operation, which prevents this valuable preliminary treatment. It is therefore of the greatest importance that all patients suffering from massive hernias should be operated on before strangulation occurs. That is, such patients, even though the hernia is reducible, should come to operation promptly, and at a time when careful preparation will give the best chance for cure of the hernia, without annoying or dangerous complications.

The preliminary treatment as we carry it out is a modification of that suggested by Johannes Hahn.[1] The patient is put to bed, and in addition to the routine physical examination, the blood-pressure is recorded two or three times a day and a phthalein test for the kidney function is made. A binder is snugly applied to the abdomen; padding the hernia should this be irreducible. The binder is gradually tightened, and the effect of this on the blood-pressure, heart's action, and respiration noted. The pressure of the bandage is increased as rapidly as it can be tolerated by the patient, and later small, flat sand-bags applied under the bandage add to the pressure. During this procedure the hernia if reducible is retained by a pad pressed into the opening, and if irreducible is so surrounded by cushions of cotton and gauze that the pressure does not increase the amount of its contents.

Respiratory difficulty, rapid change in blood-pressure, irregularity of the heart and gastro-intestinal disturbances, are signals for the relief of pressure, and against any operative procedure.

The diet is restricted to liquids and soft solids, without milk. The bowels are kept moving freely by daily mild salines, rather than by drastic purgatives. We have had no cases in which the hernia and obesity were associated with distinct disturbances of the endocrine system. In such cases the proper glandular feeding should precede operation.

Whenever the kidney function is inhibited, as shown by the phthalein excretion, the patient is given large quantities of dilute cream of tartar solution, and the intake and output of water recorded. The phthalein test is repeated at short intervals and when the excretion comes to a safe point and remains there, operation is performed. As in all phthalein examinations, a constant excretion even of a small amount

[1] Arch. f. klin. Chirurg., 1908, lxxv, 3, 718.

offers a better chance for the operation than a larger quantity with wide variations.

This preliminary treatment may last from a few days to one or two weeks, according to the severity of the handicap, and the manner in which the patient responds to the treatment. The good effect of this method of managing such patients is shown in the following case from our series:

S. 4393. Abdomen. Hernia. Umbilical, Massive. White, female, aged fifty-nine years, single. Quite fat, abdomen pendulous with thick, fatty layer. Hernia irreducible, pear-shaped, capacity of about 700 c.c. Blood-pressure 240, kidney function 37 per cent., trace of albumin and a few granular casts in the urine.

This patient was given the preliminary treatment as noted above. In three days the phthalein output reached 52 per cent. in two hours, while the blood-pressure fell to 200. On the fifth day the output was 67 per cent. in two hours with 3000 c.c. of urine, specific gravity 1008 in 24 hours. At the same time the blood-pressure had dropped to 170. The next morning the operation was performed under gas and novocain anesthesia. Re-breathing sent the blood-pressure to 230, but this quickly fell to 200 under direct nitrous oxide. About 150 grams of omentum were removed with the sac and the hernia closed in an ideal way. The patient recovered without any complications. There was enough distention of the stomach to require lavage about 12 hours after the operation, but after this time the patient was not uncomfortable. On discharge, the blood-pressure was 190 and the kidney function 56 per cent. At the present time, 9 months after the operation, the general condition of the patient is practically the same as on her discharge from the hospital.

When the massive hernia is strangulated no preliminary treatment is possible and the surgeon must choose between the risk of an immediate closure and the annoyance of a two-stage operation, provided the patient is not already in

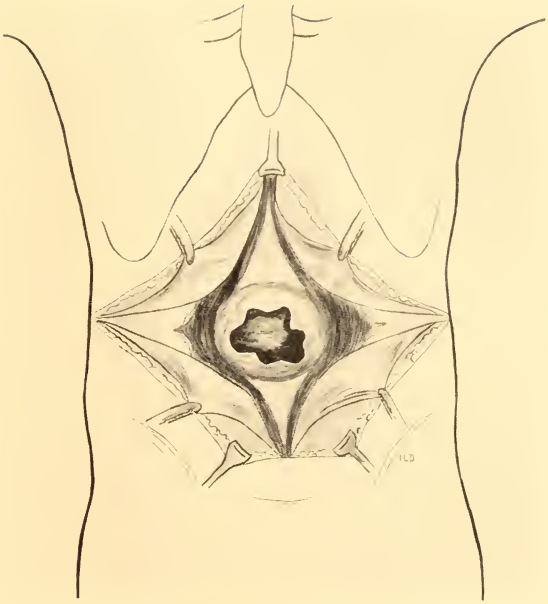
the toxic stage of obstruction. In the latter event the two-stage operation is the only one to be considered. Rapid removal of the contents of the obstructed loop of bowel by an enterostomy is the important indication in these cases. With gangrene added to obstruction, the extent of operation will vary from enterostomy with extrusion of the gangrenous bowel to resection and anastomosis according to the degree of toxemia. As a rule it is better to have an enterostomy above the point of obstruction. When the gangrenous loop is high in the small intestine, the lateral anastomosis between the upper and lower healthy areas should be made at the primary operation, even in toxic patients. The end of each segment is left open or sutured around a rubber tube, draining the obstructed loops. The anastomotic opening provides a channel through which some nutritive material may pass down the intestine during the closure of the bowels ends, and makes it possible to close these ends by simple suture as soon as the toxemia is relieved.

Having controlled the obstruction the patient is prepared for the hernial closure in the usual way, and this operation is performed as soon as the general condition of the patient and the abdominal wound permit.

The two-stage operation in the absence of toxemia and obstruction is advised by Hahn.[1] At the first operation the constricting tissues are divided sufficiently to allow easy reduction of the hernia, and the skin is sutured. The hernia is held in the abdomen by a pad and bandage, by means of which the intra-abdominal pressure may be controlled. The preliminary treatment is now carried out and when the condition of the patient becomes favorable the second radical operation is performed.

The history of one of our cured strangulated hernias illustrates a successful method of handling these very ill patients.

[1] Loc. cit.



Showing the four flaps of fascia, and the opening of the rectus sheath, preparatory to the suture.

S. 2739. Abdomen, Hernia. Strangulated, Umbilical, Massive. White, female, aged fifty-two years; hernia many years; strangulation twelve hours. Patient very fat with pendulous abdomen, hernia enormous. Handicap, severe toxemia, cyanosis, failing heart. The operation was performed by Dr. Bloodgood under novocain infiltration. On opening the sac, gangrenous small intestine presented itself. The constriction was divided and the bowel withdrawn until sufficient healthy gut was obtained to make a lateral anastomosis beyond the gangrenous segment, which was then excised. The divided ends were left open and in each a rubber tube was sutured. The peritoneum was closed around the extruded ends and the wound packed with gauze. The patient recovered from the toxemia rapidly under the usual treatment. The ends of the divided small bowel were closed after repeated suturing, and finally the radical operation for the hernia was performed two months after the strangulation. The patient is well two and one-half years after the operation.

Ruge's study of the pathology and treatment of umbilical hernia,[1] throws light on the etiology of this lesion and indicates the ideal to be sought in its treatment. Ruge argues that the proliferation of preperitoneal fat causes one or more defects in the anterior abdominal fascia through which the hernia protrudes. As the hernia enlarges the recti are pushed apart with greater or less degeneration according to the extent of the separation, the duration of the lesion, and the general condition of the patient. The lateral separation of the muscles usually extends for a considerable distance above and below the hernial ring, leaving a diamond-shaped area of the abdominal wall without muscular covering.

Although trauma, especially violent exertion during parturition, is commonly mentioned as an etiological factor, such trauma is simply accessory, forcing the abdominal contents through an already existing defect.

[1] Archiv. f. klin. Chirurg., 1909, xci, 1,

Graser[1] describes what may be called the ideal operation for the cure of these hernias. This operation aims at the restoration of the anatomical condition of the abdominal wall by suture of the recti, after excision of the sac and closure of the peritoneum and reinforcement of this suture by overlapping of the rectus sheath and the fascia. The method combines several principles from various hernia operations. Probably the most important are the transverse overlapping of the fascia, brought out in the Mayo operation for umbilical hernia, and the wide lipectomy advised by Kelly.

In the pathological anatomy of these massive hernias, the condition of the rectus muscle is often such that the ideal operation of Graser can not be performed. We have found the exposure of the upper and lower limits of the separation of the recti a great help in bringing the muscles together over the hernia. This exposure requires the removal of a wide area of skin and subcutaneous fat, and may require the removal of a longitudinal segment in addition to the transverse lipectomy. The rectus sheath is opened at the limits of the diastasis, and as the muscle is brought out it is sutured to its fellow.

The operation as we perform it whenever possible is as follows: An ellipticolanceolate incision is made around the hernia, through the skin and fat down to the aponeurosis of the external oblique. This incision extends from flank to flank in most cases, but occasionally in post-operative hernias through the rectus muscle, the incision is made in a longitudinal direction. The short diameter of the wound is of such length that when the lipectomy is completed, the pendulous condition of the abdomen will be overcome.

Beginning at the tip of the incision the fat is dissected from the aponeurosis. As the middle line is approached several veins perforating the aponeurosis will require liga-

[1] Arch. f. klin. Chirurg., 1906, lxxx, 2.

tion. In many cases these perforating vessels will be accompanied by small protrusions of fat, and their situation marks the limit for removal of the preperitoneal deposit. The dissection is carried up to the neck of the hernia and then over the sac, separating the skin as far as possible without opening the peritoneum. Should the sac be opened at this time, the contents are retained by a Mikulicz pad.

The upper and lower margins of the fatty layer are now separated from the aponeurosis and retracted until the limits of the diastasis of the recti are exposed. In some cases this will require the removal of another segment of skin and fat extending from the ensiform to the pubes.

Beginning above and below at the limits of this diastasis and laterally far enough out to be beyond the inner edge of the rectus muscle the aponeurosis is divided by incisions radiating to the centre of the hernial ring. Far out it is not difficult to separate the aponeurosis from the rectus sheath and so secure a line of cleavage which may be followed when the fascial layers become thin and adherent nearer the hernia. The four flaps resulting from these incisions are retracted and the layer of preperitoneal fat thus exposed is removed. The sac is now opened and the contents reduced. When the contained omentum is adherent, and especially when it has been rolled into a firm mass with considerable fibrosis, excision of the mass is better than its separation and reduction. The removal of a portion of the omentum reduces the amount of material which must be returned to the abdomen and consequently the post-operative increase in tension. But this removal is not free from danger. Embolism and damage to the circulation of the stomach wall resulting in ulceration and hemorrhage may follow extensive ligation of omental vessels. The sac is closed by a continuous silk suture and the excess amputated. Occasionally the sac is not opened but the hernia is reduced *en bloc*.

After disposing of the sac, the closure is commenced by

opening the rectus sheath at the apex of the separation, and sewing the posterior sheath and the muscle to their fellows of the opposite side by mattress sutures of silk. The splitting of the sheath and the suture proceed as long as the tension can be overcome. In favorable cases proceeding in this way from above and below the recti can be brought together all the way over the hernia. When the separation is too wide, or the atrophy of the muscle too great to permit the complete suture, the drawing out of the recti proceeds as far as possible from above and below. There is then left uncovered by muscle an irregular lens-shaped area near the hernial opening. The sheath is now split laterally and the muscle and posterior layer sutured transversely with as much overlapping as possible. Unless the separation and degeneration have been very great the muscle and sheath will at least be brought in contact over the entire area. The flaps of external oblique are now sutured. First the longitudinal incisions are closed with imbrication of their edges and then the lower flaps are brought up under the upper ones by a row of mattress sutures, and the edge of the upper flap sewed down in the same manner. A few deep sutures of silver wire or silk-worm gut are placed in the skin and fatty layer for tension, and the remainder of the skin wound is closed with interrupted silk. Protective drains are placed at the angles and in two or three spaces in the suture line, or one cigarette drain is brought out from the aponeurosis through a stab wound below the incision. A cross bandage of adhesive plaster reaching from well up on the ribs to the trochanter of the opposite side is applied over the sterile gauze dressing. A many-tailed binder covers the entire abdomen.

The post-operative treatment is that usually employed after laparotomy, with special treatment of any handicap on the part of the individual patient. Practically all these patients require washing out of the stomach for the relief of distention during the first twenty-four hours after operation.

UNUSUAL CASES ILLUSTRATING POINTS IN DIAGNOSIS AND TREATMENT

I. A Calcified Lymph-gland Producing Symptoms Somewhat Suggestive of Gall-stones.
II. An Old and Infected Abdominal Pregnancy with Extension of the Long Bones into the Bladder and into the Bowel.
III. A Further Case of Adenomyoma of the Rectovaginal Septum.
IV. Operation for the Radical Cure of an Umbilical Hernia in a Patient Weighing 464 Pounds.
V. Removal of a Large Tuberculous Cyst of the Mesentery of the Jejunum, together with the Corresponding Segment of Bowel; Recovery; Later Death, Apparently from Tuberculous Meningitis.

By Thomas S. Cullen, M.D.
Baltimore, Maryland

I. A CALCIFIED LYMPH-GLAND PRODUCING SYMPTOMS SOMEWHAT SUGGESTIVE OF GALL-STONES

Mrs. C. S. was referred by Dr. S. Denny Willson and operated upon at the Church Home and Infirmary on June 9, 1914. In December, 1913, she had had sharp pain in the right lower abdominal quadrant and had been confined to bed for three days. There had been no vomiting at this time. In February, 1914, she had had a second attack and ten days before admission a third. During this last attack there had been vomiting and fever. Her previous history was unimportant save for the fact that there had been a slight tenderness in the right lower quadrant. In other words, the patient gave a definite history of a mild appendicitis, and on one occasion there had been a yellowish tinge to the eyes.

Operation: I made a right rectus incision, not being absolutely certain whether the gall-bladder was involved or not. We removed the appendix, which was twice the natural size and contained a concretion. I examined the gall-bladder region and felt what appeared to be a stone. I accordingly lengthened the incision and then saw a stone beneath the junction of the cystic and common ducts (Fig. 1). This was irregular in outline, about 1.5 cm. in diameter and embedded in a little scar-tissue. It was gradually peeled out.

Dr. Paul Wegefarth, who was standing by my side, suggested that we were possibly dealing with a calcified lymph-gland. Both ducts were of normal caliber and free from induration. Neither the common nor the cystic duct was opened. A small drain was carried down to the point of removal of the stone. Examination of the so-called stone tended to show that it was really a calcified lymph-gland.

Dr. Wegefarth examined the stone chemically. With hydrochloric acid and also with nitric acid the stone substance dissolved completely, giving off carbonic acid. The test for bile was negative. A portion of the stone was ground up and then mixed with alcohol and ether. Examination of the residue was made for cholesterin with negative results.

There is no doubt that this apparent calculus represented an area of calcification. Its size, shape, and situation tend to show that it was a calcified lymph-gland. The chemical examination demonstrated conclusively that it bore no resemblance whatsoever to a gall-stone.

II. AN OLD AND INFECTED ABDOMINAL PREGNANCY WITH EXTENSION OF THE LONG BONES INTO THE BLADDER AND INTO THE BOWEL

Gyn. No. 13,806. L. S., aged thirty-three years, colored; admitted to the Johns Hopkins Hospital, May 3, 1907;

discharged, June 26, 1907. Apart from the fact that the woman had never been strong the early history was unimportant.

The menses began at thirteen and were regular. She married at eighteen. Two years later she had a miscarriage at the third month, and three years later a second at one month. Ten years after marriage she had a child. The labor was instrumental and there was much tearing. She was in bed two months with high fever, and had a great deal of vomiting and abdominal pain. After this the periods became too frequent, coming on practically every two weeks. Since a supposed miscarriage (three years before admission) the menses have occurred at irregular intervals of four to eight weeks; they have been profuse and have lasted from two to three weeks. The last period began April 7, 1907, and persisted for fourteen days.

Present illness: For the last five years the patient has had pain in the right lower abdomen, usually dull in character and occasionally accompanied by nausea. There have been no chills, no fever, and no vomiting. The abdominal discomfort is not present every day. It is aggravated by exertion.

Three years ago the patient was supposed to be pregnant. The periods ceased; there was morning sickness and later the perception of fetal movements. There was colostrum in the breasts and abdominal enlargement. She developed severe abdominal pain which was labor-like in character. This lasted for five minutes and then suddenly ceased, but the patient passed only blood. Immediately after she noticed a hard, tender lump in the right lower abdomen. This lump has gradually become smaller, as has also the abdominal enlargement. The patient has not lost in strength. There is no swelling of the feet, but dyspnea has been noted on exertion, and for two months last winter there was a cough and occasionally night sweats. The patient has had a good deal of indigestion but no jaundice. She complains

of burning in the urethra, micturition is frequent and scanty and the urine at times is mixed with blood. She has a profuse odorless but irritating vaginal discharge.

On admission to the hospital the patient did not look acutely ill. Her tongue, however, was furred. The pulse was a little rapid but of good volume. The abdomen was distended on the right side by an irregular nodular mass, which on palpation gave a peculiar feeling of crepitus differing from anything that I have ever felt. The mass was irregular but hard, like a myoma. On pelvic examination the cervix was found to be firm, the uterus slightly enlarged and in retroposition. On the right side was a mass which was apparently connected with the body of the uterus. The structures on the left side could not be palpated.

From the history and examination the condition was diagnosed before operation as an abdominal pregnancy. The patient was catheterized when under ether, and a large quantity of thick, tenacious urine was obtained. In the bladder the catheter also encountered something which felt very much like a stone.

Operation, May 4, 1907: I made a median abdominal incision. The peritoneum was opened and at once disclosed a large irregular mass in the right lower abdomen, with the omentum densely adherent to it. After the omentum had been doubly ligated and severed, the upper portion was pushed back out of the way and the parts were carefully walled off. The large and small bowel were found to be densely adherent to the sac. The small bowel was dissected away as carefully as possible, but the outer coat was torn about twelve inches above the ileocecal valve. This tear was immediately repaired with a continuous Pagenstecher suture.

On opening the sac I found it contained a large number of fetal bones, as indicated in Fig. 2. After removing the greater number of the bones I attempted to enucleate the sac. The left tube and ovary were now removed and the sac

on the right side was gradually loosened up. The bladder was found densely adherent and connected with the extra-uterine mass. After being freed by blunt dissection, it was noted that one of the long bones projected into the bladder and that the portion within the bladder was covered with a thick deposit of urinary salts (Fig. 2). The bladder opening was closed with catgut and with a continuous Pagenstecher suture. The enucleation of the sac was continued until it was delivered from the abdomen. The large bowel was then examined. There were two openings in the cecum, one at the junction of the ileocecal valve. The vermiform appendix was thickened and indurated. It was situated 2 cm. from this hole in the cecum. The appendix was removed and the hole in the bowel closed in with two continuous Pagenstecher sutures. The second opening in the cecum was 6 cm. from the ileocecal valve. This was drawn up into the wound and sutured in a similar manner with two continuous Pagenstecher sutures. The holes in the bowel had been made by the ends of the long bones which had ulcerated through and were projecting into the lumen.

A parovarian cyst was also removed from the right side. A cigarette drain was placed in the lower angle of the incision and carried down to the cecal region and also into Douglas' cul-de-sac. Owing to the difficulty in getting adequate exposure at the beginning of the operation the right rectus muscle was cut through.

The patient was returned to the ward in a very weakened condition. She had a quiet night, but was much nauseated and saline infusions were given. On May 6 the retention catheter which had been left in the bladder was removed. On May 7 a note was made that the nausea still continued. The patient gradually improved, although the abdominal incision broke down over a considerable area. After several days a small amount of urine commenced to escape from the abdominal wound. On June 25 it was noted that the wound looked very well. The leakage of urine had ceased.

On the day of her discharge, June 27, the following note was made: "The abdominal incision has healed well. There is no tenderness, but still a little thickening of the incision. The patient has gained in weight and has generally improved. A No. 9 cystoscope was introduced into the bladder. No reddening was found. The mucous membrane was everywhere white, glistening, and smooth, and the bladder-vessels were not injected. The urine was perfectly clear."

Path. No. 11,534. Sections from the wall of the sac show that it consists partly of omentum, partly of granulation tissue, which is very edematous. The right ovary is edematous and cystic and measures 6.5 x 5.5 x 3 cm.

In this case the uterus had evidently ruptured at the time of the patient's severe pain and the fetus had escaped into the right lower abdomen. A slow inflammatory process had gradually developed, and eventually the ends of the long bones had been forced through into the bowel and bladder.

III. A FURTHER CASE OF ADENOMYOMA OF THE RECTO-VAGINAL SEPTUM

At the last meeting of the Southern Surgical and Gynecological Association I reported two cases of this character. At that time I referred to two instances recorded by Cuthbert Lockyer and also mentioned two specimens sent me by Dr. D. S. Jessup.

Dr. Jessup has since reported his two cases in full in the Section on Pathology and Physiology of the American Medical Association, 1914. Recently another patient with adenomyoma of the rectovaginal septum has come under my care.

Miss K. T., aged thirty years, was referred to me by Dr. Alexius McGlannan, October 16, 1914. I first saw this patient at the Johns Hopkins Hospital on November 10, 1906. At that time I removed the left tube and ovary and resected a portion of the right ovary. The appendix was also

removed. When I saw her again she complained that she was incapacitated for two days before and after her period and that her suffering was almost unbearable. She was well nourished, weighed 170 pounds, and for the previous two or three months had been having about six bowel movements a day. The stools had been normal in color. Her discomfort had been so great that she insisted on having something done.

Operation, October 19, 1914: On opening the abdomen we found adhesions everywhere in the pelvis, and the rectum was almost completely obstructed just posterior to the cervix. We found it necessary to do a complete hysterectomy. This was accomplished with much difficulty. The ureters on both sides were outlined and the uterus was removed. The cervix was so densely adherent to the rectum, over an area about 2.5 cm. in diameter, that it was necessary to cut through this tissue, which was almost as hard as gristle. The rectum was carefully examined and found to be almost completely obstructed. It was then brought up as far as possible. Its peritoneum was severed but its vessels were not disturbed. After the rectum had been freed for about eight inches the pelvis was packed with gauze and the anal margin all the way around was incised just as for an extensive Whitehead operation. About eight inches of rectum were then drawn through the anus and removed together with the growth. The rectum was then attached to the skin. The patient did not lose very much blood considering all that was done.

After she was returned to the ward her pulse steadily increased, although there was no evidence of hemorrhage. About seven hours after operation signs of sudden cardiac dilatation developed and the patient soon died.

The growth situated between the cervix and the rectum, was intimately blended with both. It was about 3 x 2 cm., very dense in texture, and projected into the lumen of the bowel. The rectal mucosa itself was intact, normal, and

showed no evidence of ulceration or inflammation. In some places the muscle of the myoma was continuous with that of the bowel. At other points a little adipose tissue intervened or lobules of fat were surrounded by non-striated muscle.

Scattered throughout this myomatous growth, which was diffuse in character, were islands of uterine mucosa (Figs. 3 and 4). In some places just a triangle of the typical stroma of the mucosa was visible. At other points were isolated glands, surrounded by stroma; or a small cavity was seen lined with cylindrical epithelium, which had glands extending into it. In other places there were large areas of uterine mucosa surrounded by the characteristic stroma, or there was a long drawn out ribbon-like mass of stroma with one or two long and tortuous glands lying in it. In some sections there was a definite area of mucosa, at least 8 mm. long by 3 mm. broad. Here, with the low power, the mucosa occupied more than one field, no muscle being visible. Such areas are really miniature uterine cavities.

The growth is a typical adenomyoma of the rectovaginal septum, evidently starting in or near the cervix and gradually invading the rectum by continuity, but respecting the rectal mucosa at all points. The bowel was so nearly obstructed, however, that we were forced to remove at least 8 inches. The ideal method would have been to excise the area of the growth and then close up the defect.

IV. OPERATION FOR THE RADICAL CURE OF AN UMBILICAL HERNIA IN A PATIENT WEIGHING 464 POUNDS

Mrs. C. J., aged thirty-five years, was admitted to the Church Home and infirmary, February 11, 1914. She had had five children, the youngest being eight months old. At the time of her marriage she weighed 225 pounds. Her weight on admission was 464 pounds. She complained of

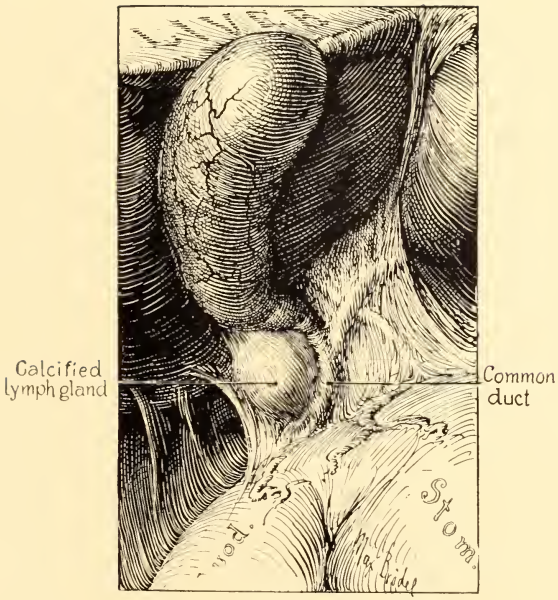


Fig. 1.—A calcified lymph gland embedded in adhesions and lying against the cystic and common bile ducts. (Case I.)

Fig. 2.—Fetal bones contained in the abscess sac of an old abdominal pregnancy. These have been roughly placed together. One end of the long bone (at the bottom of the picture) is much thickened. This is due to the fact that it had ulcerated through into the bladder, where it had become encrusted with phosphatic deposits. This bone has been photographed on a larger scale than the others.

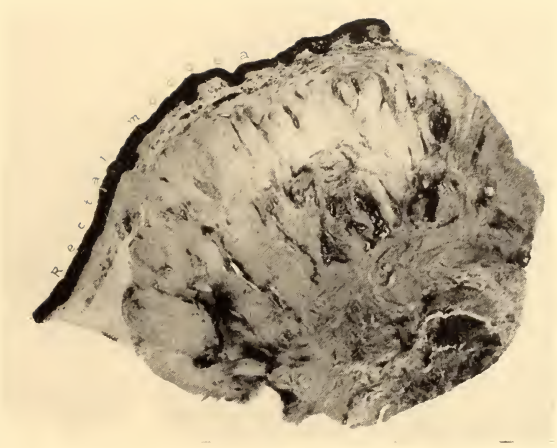


Fig. 3.—Adenomyoma of the rectovaginal septum. The upper dark ribbon is rectal mucosa, which is intact. Intimately blended with the rectum is a well-defined and relatively circumscribed growth. Scattered throughout it are isolated glands surrounded by stroma and large islands of typical uterine mucosa. For the appearance under the high power see Fig. 4.

Fig. 4.—Adenomyoma of the rectovaginal septum. This is one of the islands of mucosa seen in Fig. 3. The glands are identical with those of the uterine mucosa, and they lie embedded in the characteristic stroma of the mucosa. This shows some small round-cell infiltration. Surrounding this island is the usual diffuse myomatous tissue.

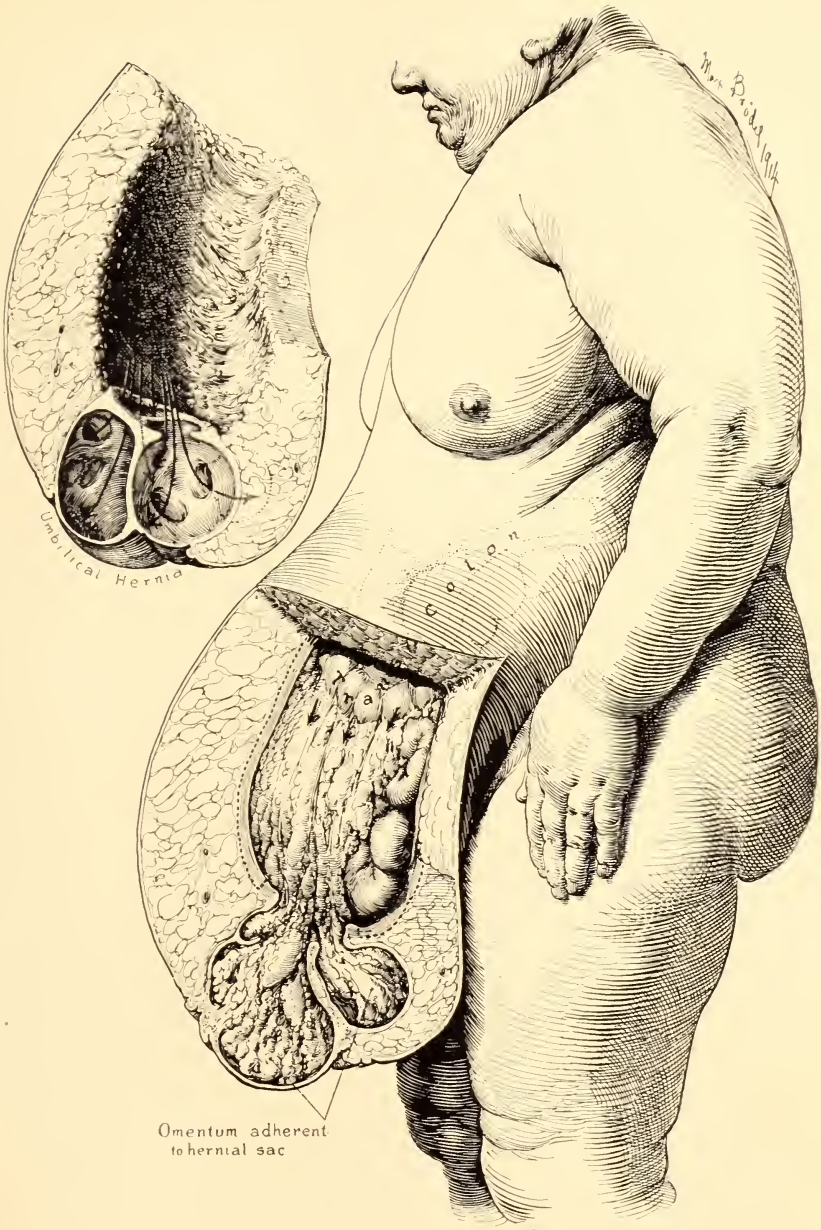


Fig. 5.—An umbilical hernia and a markedly pendulous abdomen in a patient weighing 464 pounds. This is a sketchy outline of the condition found. With the patient standing the pendent portion of the abdomen reached the knees. As the omentum was adherent to the hernial sac the transverse colon was markedly drawn downward. The dotted line indicates the line of dissection, the fat of the abdominal wall being removed down to the fascia. The hernial sac was divided into numerous secondary cavities. This is particularly well seen in the upper sketch of the hernial sac, which was drawn after removal.

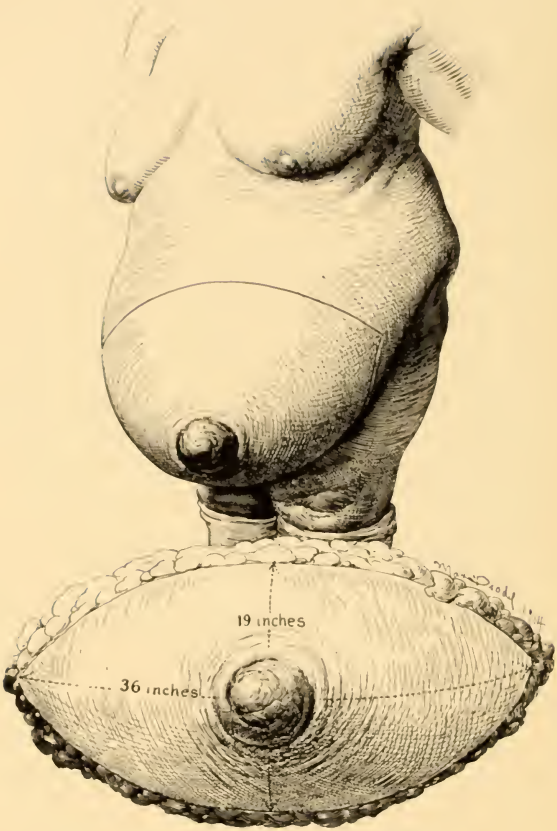


Fig. 6.—An umbilical hernia associated with marked prolapse of the abdominal wall. The umbilical hernia was about 10 cm. in diameter. The elliptical transverse incision is indicated by the black line. The lower figure indicates the shape and size of the piece of adipose tissue removed.

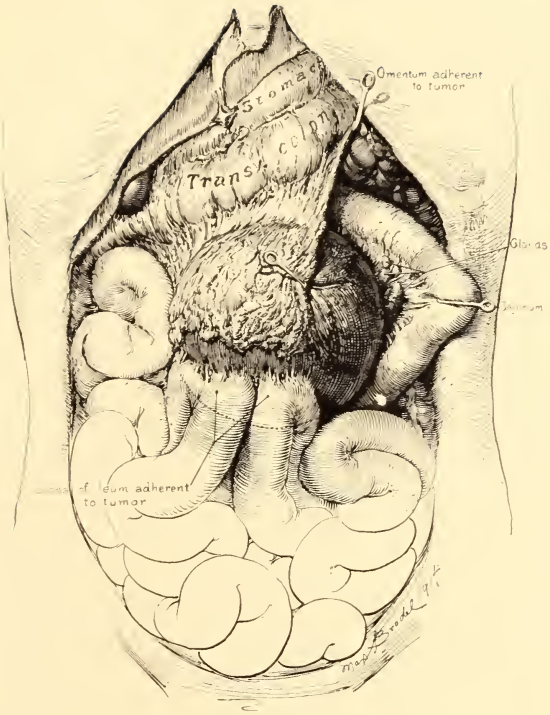
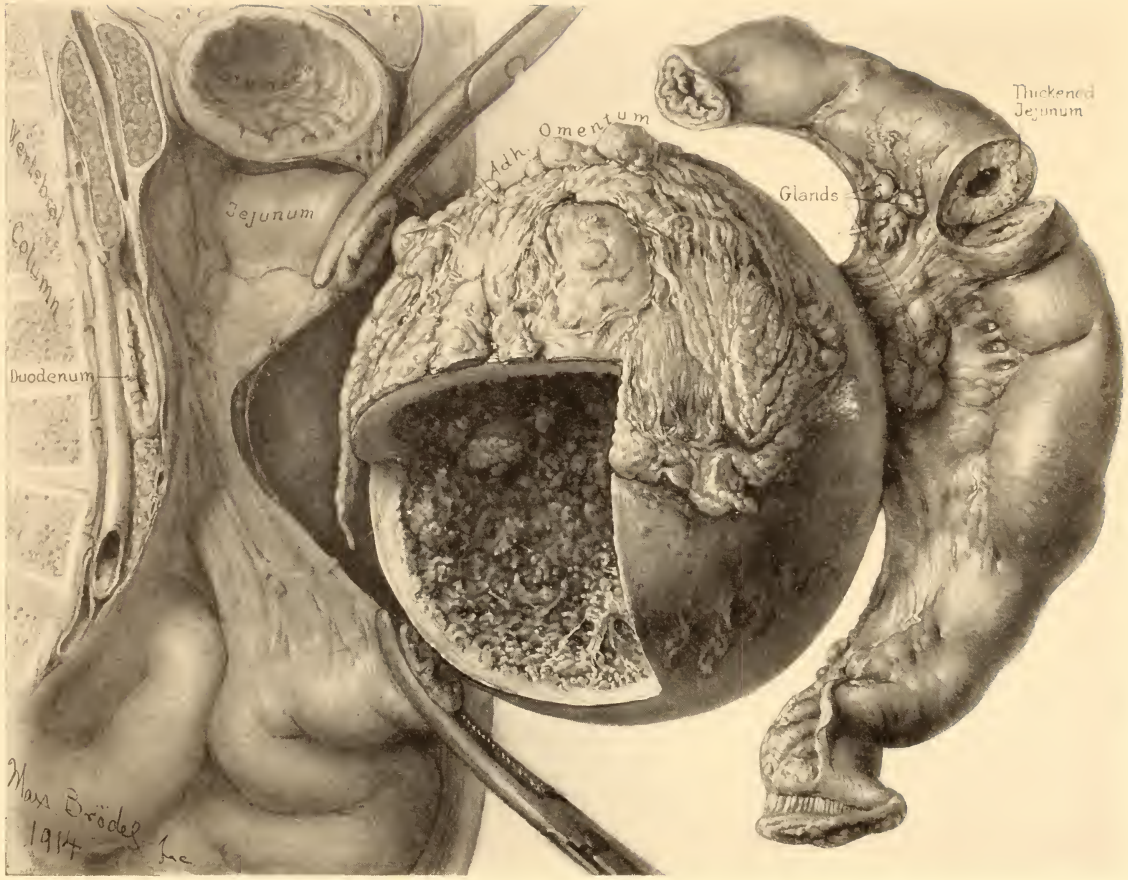


Fig. 7.—A tuberculous cyst springing from the mesentery of the jejunum. The cyst was globular, occupied the centre of the upper abdomen and was partly covered by adherent, red, and greatly thickened omentum. Below it was adherent to several loops of small bowel. The omentum was severed near the transverse colon and the loops of small bowel were liberated. The cyst was then gradually loosened, as far as feasible, from its attachment to the mesentery. The loop of jejunum here shown was thickened, but at operation seemed to be normal. A glance at Fig. 8, however, demonstrates that its mucous coats are much thicker than usual. In the mesentery of the jejunum are markedly enlarged lymph glands.

Fig. 8.—Tuberculous cyst of the mesentery of the jejunum. Resection of the jejunum together with the cyst. Temporary recovery. The right half of the drawing showing the mesenteric cyst and the jejunum is an accurate portrayal of the specimen removed. The left half gives a more or less schematic representation of the relation of the cyst to the body. The cyst was spherical, had a definite basal mesenteric attachment, about 3 x 3 cm., and was covered with greatly thickened indurated omentum. The cyst walls varied from 2 to 3 mm. to 1 cm. or more in thickness. The inner surface presented a friable, worm-eaten appearance and the pus was odorless, rather thin, and greenish yellow in color. At the cut ends of the jejunum the mucosa is practically normal, but a section near the centre of the loop shows marked thickening of the bowel wall, together with much narrowing. As shown in the illustration, the glands in the mesentery are considerably enlarged. The ends of the bowel which were held by forceps were closed and a lateral anastomosis was then made. This was a rather difficult procedure on account of the shortness of the remaining portion of the jejunum.


Vertebral Column
Jejunum
Duodenum
Adh.
Omentum
Glands
Thickened Jejunum
Max Brödel
1914

an umbilical hernia which was about 10 cm. in diameter. When on her feet, the abdomen hung down to the knees. The dragging sensation caused thereby was so great that she was forced to keep off her feet as much as possible.

Operation, February 12, 1914: I was unwilling to operate and explained the danger to her husband. The patient who is still a relatively young woman, said she was becoming a semi-invalid and insisted that she be relieved. On account of the marked redundancy of the abdominal wall, we decided to remove a large quantity of fat with the hernia, as advocated by Dr. Howard A. Kelly. Accordingly a large transverse, elliptical area was outlined (Fig. 6). This area, when measured after removal, was 36 inches from side to side and 19 inches from above downward. The adipose tissue of the tremendous flap was dissected from the fascia of the abdominal wall all around as far as the neck of the hernia. Then, with the finger in the abdomen as a guide, the neck of the sac was cut at its approach to the abdominal wall. The dotted line in Fig. 5 indicates the line of dissection. The omentum in the sac was so intimately blended with the walls of the sac that this portion was cut off and removed together with the sac and redundant tissue.

In the upper sketch in Fig. 5 Mr. Brödel has clearly shown the neck of the sac and the numerous chambers passing off from it. The hernial opening was closed by the Mayo method of sliding the fascia of the lower margin of the opening up under that of the upper margin. We used kangaroo tendon for the mattress sutures and, after the first row had been placed and tied, the edges of the upper flap were fastened down with a second row of mattress sutures. The abdominal wound was now approximated by interrupted silver wire and silkworm-gut sutures. Accurate skin approximation was obtained with continuous black silk thread. At each end of the incision a protective drain was introduced.

The patient made a speedy recovery and the abdominal wound healed perfectly. When the stitches were removed

the abdominal incision had contracted until it measured only 27 inches from side to side. The patient, eight months later, was in excellent health.

V. REMOVAL OF A LARGE TUBERCULOUS CYST OF THE MESENTERY OF THE JEJUNUM, TOGETHER WITH THE CORRESPONDING SEGMENT OF BOWEL; RECOVERY, LATER DEATH, APPARENTLY FROM TUBERCULOUS MENINGITIS

Bella R., a frail girl, aged five and a half years,[1] was referred to me by Dr. Julius Friedenwald and Dr. Harry Goldberg on May 27, 1914.

Two weeks before her admission to the Church Home and Infirmary a tumor was first noted in the upper abdomen. This was globular, appeared to be about 10 cm. in diameter and could be pushed from one side of the abdomen to the other. It lay somewhat to the left of the median line.

There was a leukocytosis of 15,000. The urine was normal. The history gave absolutely no clue as to the probable character of the growth. The majority of those who saw the patient thought that the tumor was probably an enlarged left kidney, but no one ventured a positive diagnosis.

Operation: I made a median abdominal incision, commencing a short distance below the xiphoid and ending near the umbilicus. The tumor lay below the transverse colon and was covered over by a greatly reddened, thickened, and adherent omentum (Fig. 7). The omentum was cut across near the transverse colon and we gradually loosened up the cystic tumor, freeing it from several loops of small bowel and separating it from the adherent mesentery. After getting good exposure, we found that the tumor sprang from the mesentery of the jejunum. We continued our dissection, hoping that it would be possible to completely

[1] In my article in Surgery, Gynecology and Obstetrics, through an error the age was given as two and a half years.

enucleate the cyst without injuring the blood supply of the jejunum. When this had been almost accomplished, the tumor having been freed except over an area of about 3 x 3 cm., a little pus commenced to escape. Fortunately, the tumor was at this stage of the operation mobile enough to be partially lifted out of the abdomen. It was slit open and evacuated into a large basin with little or no contamination to the abdominal contents. The sac contained about 700 c.c. of a rather thin greenish yellow, odorless pus. When empty it was clamped off and removed. It was then found that the blood supply of a large area of the jejunum had been cut off, as the same vessels that supplied the tumor also supplied the bowel. It was further seen that no matter in what manner the sac had been removed the blood supply of the bowel must of necessity have been cut off. The portion of the jejunum which had lost its blood supply was clamped and cut (Fig. 7). Both ends were closed and a lateral anastomosis was made. It had been necessary to cut off the jejunum about three inches from the point where it passed to the left over the vertebral column. This short end naturally made the anastomosis rather difficult. A cigarette drain was carried down near, but not to, the point of anastomosis and the abdomen closed.

Within a few hours after operation the child was carried out on the veranda and there she remained throughout her sojourn in the hospital. She steadily improved and had no abdominal complications whatsoever. About two weeks after operation a partial facial paralysis was noted on the left side, but this did not interfere with her recovery.

Path. Nos. 20,246 *and* 20,287. Sections through the wall of the sac show that the outer surface is composed of fibrous tissue poor in nuclei. In some places it has a laminated arrangement. At other points the fibers run in all directions. There is a good deal of hyaline transformation. As one approaches the inner surface there is a tremendous amount of small round-cell infiltration and the tissue at certain

points looks like ordinary granulation tissue, having a very abundant blood supply. Where this granulation tissue exists, the inner surface of the sac is covered with fibrin, which has in its meshes small round cells and polymorphonuclear leukocytes. At other points scattered through the granulation tissue are giant cells. Some of these resemble tremendous plaques of protoplasm with rather deeply staining nuclei scattered throughout it. At other points are round or oval areas of protoplasm with oval or vesicular nuclei arranged chiefly around the margin of the large cell. At other points are huge giant cells surrounded by small round cells or separated from the round cells by a zone of epithelioid cells. In other words, the picture is that of typical tuberculosis. In some places ten to fifteen giant cells are visible in one field. This is without doubt a tuberculous cyst of the mesentery of the jejunum. Sections from the growth in the small bowel fail to show any evidence whatsoever of tuberculosis.

In four or five weeks the patient was walking well and was going from her home to the Johns Hopkins Hospital to receive electrical treatment for the facial paralysis. She came to see me at the office shortly before the summer vacation.

Dr. Goldberg tells me that during the summer her appetite was good and that she gained four pounds. Suddenly, about two months after the operation, she was taken with severe headache, which at first was occipital, but which later extended all over the head. On the next day, when Dr. Goldberg saw her, she was in a semi-comatose condition, was irritable and cross and wished to be let alone. The light seemed to hurt her eyes and she did not care for food or water. The pupils were dilated and gave little or no reaction to light. The respirations were rapid, the pulse was quick, the temperature 99.4° F. The heart and lungs were normal, the abdomen was scaphoid. The child lay with her limbs flexed and with her face away from the light.

She remained in this condition for several days. She was obstinately constipated. After the bowels had been emptied she showed some improvement for a few hours, but soon lapsed into her former condition. Some difficulty was noted in swallowing. This gradually increased and during the last two days the child refused all nourishment. Finally she became comatose and died. Three days before death partial opisthotonos was noted. There was backward traction of the head, but the knees were not drawn up.

Dr. Goldberg was unable to get an autopsy, but the clinical picture, coupled with the abdominal findings at operation, strongly suggested tuberculous meningitis as the cause of death. A tuberculous condition of the meninges is little to be wondered at when we remember the massive primary focus of tuberculosis in the mesenteric cyst.

DIAPHRAGMATIC HERNIA—REPORT OF FIVE CASES

By John D. S. Davis, M.D.
Birmingham, Alabama

My records show that I have seen five cases of diaphragmatic hernia, one death and four recoveries.

The first case was injured on November 15, 1902; a stout, strong built fireman in the city of Birmingham. While holding a water nozzle up on a ladder he was wrenched to one side and severely strained. He dropped the hose and fainted. He was lowered from the ladder, put in an ambulance and carried to the St. Vincent's Hospital. He suffered great agony, which was relieved by morphine. In my absence the late Dr. George Brown saw the case and treated him for four days. When I saw him at this time the left chest was dull on percussion, the heart displaced to the right, and the abdomen rigid. He had not been able to retain food or water; both returned as soon as swallowed. We concluded the chest was full of blood and decided to aspirate him. Several physicians saw him at this time and all agreed to the aspiration. I suggested the possibility of a diaphragmatic hernia, but I was not sure. I had a clinic on that afternoon at St. Vincent's Hospital, and while I was at my clinic the patient's chest was aspirated by Dr. Brown and the stomach contents withdrawn. The patient died one hour later. Postmortem by Dr. Charles Whelan revealed a rent in the diaphragm with entire stomach and part of the transverse colon in the pleural cavity. The

opening in the diaphragm was about 3 inches long, beginning at the esophageal opening and extending toward the sternum. I concluded that there must have been a congenital weak spot, as the strain which produced the laceration was not very hard. This we sometimes find when a light blow, crush or strain will produce a rent or tear in the diaphragm and lead to a traumatic hernia.

The second case was seen at Dr. R. M. Cunningham's private hospital in Ensley, September 29, 1904. He was a large man who had been stabbed in the left side between the eighth and ninth ribs, through the costo-diaphragmatic sinus. When I saw the patient a section of omentum was protruding from the chest wound. Under ether I enlarged the wound and cut the eighth rib in two places about 4 inches apart so that the flap could be elevated. The transverse colon and omentum had protruded through a 2-inch incision in the diaphragm. The colon and omentum were replaced and the diaphragm closed with interrupted silk sutures. The chest was closed with interrupted wormgut sutures with a cigarette drain. I was not satisfied that all the abdominal organs had escaped injury, as wounding of the neighboring viscera is an almost inevitable occurrence when the diaphragm suffers, so I turned the patient on his back and opened the abdomen through the right rectus muscle. I found a little blood, which was removed with moist gauze sponges. No injury to the abdominal viscera was found. I closed the abdominal wound in layers with catgut sutures. Patient made a good recovery.

The third case was a negro weighing 180 pounds, received at the Hillman Hospital October 15, 1905, who had been stabbed or cut in the left side and thrown off of a running car. He was received at the hospital in a state of slight shock with dulness over the left thorax to the fifth rib. The stab was between the eighth and ninth ribs. I at once concluded that I had a traumatic diaphragmatic hernia. The man was given ether and the wound enlarged for six

inches, through which I removed about five inches of the eighth rib and found part of the stomach, transverse colon and omentum protruding through the diaphragmatic incision, two and one-half inches long, about four times as large as the skin wound made by the knife. The stomach, which had been cut, slipped back into the abdomen before I could suture the wound in the stomach. I replaced the transverse colon and omentum and closed the diaphragm with interrupted No. 2 catgut sutures; placed a small cigarette drain in the chest and closed with through and through wormgut sutures. Then I turned the patient on his back and opened the abdomen through the left rectus muscle above the umbilicus. I mopped out a little blood and sutured the wound in the stomach with a double row of continuous silk sutures. I then closed the abdomen with tier catgut sutures, leaving a rubber cigarette drain in the lower end of the incision. Drainage was removed from the abdomen on the second day and from the thorax on the fourth day. Patient made a good recovery.

The fourth case was received at my infirmary January 10, 1907, with the history of having been cut in the left chest and in the right side of abdomen during a fight. After receiving the cuts the man continued to fight until he fell from exhaustion. He was brought to my infirmary two hours after the fight and placed on the operating table. I found wound in left chest between seventh and eighth ribs near posterior axillary line, and a stab wound in the abdomen just above the umbilicus on the right side. He did not experience much pain nor did he cough or expectorate any blood. He had no difficulty on deep inspiration, he did not look actually ill, though he vomited once with no blood in the vomitus. There was a normal expansion of the chest, no cough and the respiration was not accelerated. I found the lower left chest dull and the heart slightly displaced to the right. I made an incision about six inches long and cut the seventh and eighth ribs in front and behind. Retrac-

tion of the wound gave me a good view of the stomach, which was carefully examined and replaced. The incision in the diaphragm about two inches long was closed with interrupted No. 2 catgut sutures. I closed the chest with interrupted wormgut sutures without drainage. I then turned the patient on his back and opened the abdomen through the right rectus muscle, extending two inches above and one inch below the umbilicus. I found a cut in transverse colon and a little blood in the abdomen, but no other viscera injured. The cut in colon was closed with two rows of silk sutures and the abdomen was closed with tier catgut sutures without drainage. Patient did well until the sixth day, when he had a chill and temperature ran up to 104, pulse 120. I cut a suture in the posterior portion of the chest wound and introduced a pair of forceps, which, when opened, allowed a lot of bloody serum to flow out. I introduced a small rubber drainage tube which was continued for a week. Patient continued to have fever for five days, when it disappeared and he got well.

The fifth case was a male of medium size who came into the Hillman Hospital, December 9, 1914, with two cuts in the left chest. One stab was received to the left of nipple between the fifth and sixth ribs and the other through the eighth rib on a line with inferior angle of scapula. Through the second wound a portion of omentum was protruding. One of the internes, after cleansing the chest with iodine, tied off the omentum and reduced it, then mopped wound with iodine. He then packed the wound with iodoform gauze and covered both wounds with sterile dressing. On December 11, 1914, the patient was prepared for operation for my clinic. He was placed on his right side and under ether I resected the eighth rib, making a flap with the base above according to Cranwell's method. The diaphragm had been opened two and one-half inches, through which a large portion of omentum and a section of the colon had protruded. I reduced the omentum and colon and closed the opening

in the diaphragm with No. 2 catgut sutures; placed a small cigarette drain in lower angle of wound and closed with buried catgut sutures, except skin, which was closed with interrupted wormgut sutures. Had I operated on the patient the first day he arrived in the hospital I would have opened the abdomen as a precaution for possible visceral injury. But three days later he had no evidence of abdominal injury; the abdomen was relaxed, and so I concluded that he had sustained no injury to any of the abdominal viscera. December 27, 1914, the patient left the hospital in good condition.

Hernia may take place through congenital openings, or thinnings, or through some of the natural openings, such as the stretched aortic or esophageal openings, or through tears in the diaphragm. When trauma is the causative agent the hernia may be produced immediately or at some later date. Ninety per cent. of the diaphragmatic hernia are false, devoid of sac, the peritoneal coverings being absent, leaving the hernial organs naked in the thoracic cavity. The pleural and peritoneal membranes are blended at the opening, making the margin smooth and without covering. In the remaining 10 per cent. of cases the herniated mass is inclosed in a peritoneal sac. Diaphragmatic hernia occurs on the right side in only about 8 per cent. of cases. The practical immunity of the right side is largely due to the liver, which acts as a buffer and protects the diaphragm from the effects of abdominal pressure and effectively closes the rupture. The order of frequency with which the abdominal organs escape through the rupture are the omentum, stomach and colon—a large part of the small bowel, the spleen, the liver, the kidney and the cecum have been found in the pleural cavity.

In the case of an open wound with a protruding abdominal viscera, there can be no excuse for overlooking a diphragmatic hernia. On the other hand, if only a small portion of omentum escapes into the chest the only symptoms present

may be those of indigestion and malaise from adhesions, and the hernia is overlooked. When a hollow viscera is incarcerated the physical signs are those of pneumothorax. When the Röntgen rays are used the stomach is rendered visible by the introduction of bismuth or a stomach tube. If the stomach is found visible above the convex diaphragmatic line, its presence furnishes proof of the existence of diaphragmatic hernia. On the other hand, a negative finding would not exclude hernia, as the omentum or transverse colon might be involved, which could not be shown by the radiograph. Diaphragmatic hernia is often discovered postmortem in patients who have died from other causes. On the other hand, patients have been known to recover from a traumatic hernia, and at some later date experience a dangerous attack. The mortality of these wounds, if left to themselves, is very great.

Tumors of the diaphragm, sarcoma, lipoma, enchodroma, cysts, purulent pleurisy and hypoplasia of the lung may be confused with diaphragmatic hernia. An important but rare defect, which is often confounded with diaphragmatic hernia is the eventration of the diaphragm. It assumes an abnormally high position in the trunk and is rarely diagnosed. It is usually taken for hernia. The treatment has been revolutionized during the past twenty-five years. Twenty-five years ago no cases were operated on, no textbook advised it.[1] Now cases in which operative interference has proved successful are many.

When an operation is decided upon the question arises, which is the best route to follow? If the abdominal route is selected, it is not at all easy to reach the wounded diaphragm. Prolonged and difficult maneuvres are required to bring the wound into view; if it should be found necessary

[1] See Holmes' System of Surgery, 1881; Von Bergman's Surgery, 1904; Ferguson's Operations on Hernia, 1907; Ochner's Clinical Surgery, 1911; Munford's Practice of Surgery, 1011; Bennie's Operative Surgery, 1014.

to enlarge the opening in diaphragm, the task will prove difficult of accomplishment by way of the abdomen; and finally, it will be found exceedingly difficult by this route to apply sutures to the diaphragm.

The thoracic route presents great advantages. It has one decided merit in injuries of the chest, that the external wound itself serves as a guide. The chest is to be opened at the sight of the wound, and the course of the wound followed. Further, this is the most direct route; by entrance of air into the pleural cavity, the suction power of the thorax is abolished and replacement of the hernia is less difficult. It affords space for reducing the hernia or for enlarging the diaphragmatic wound and treating the hernia. There are two objections to thoractomy. The first is the danger of pneumothorax. The second objection is that the route does not permit exploration of the peritoneum and its contents. This objection is valid in regard to those cases in which it is necessary to repair injuries and remove from the peritoneal cavity intestinal contents and blood. In the cases in which it is important to ascertain what viscera, if any, has been wounded, an abdominal section is necessary. Of course, no hard or fast rules can be made for surgical procedures, and each case will be approached according to its individual features; but from my observations the superiority of the transpleural route in the treatment of thoracico-abdominal wounds seems to be well established.

A regular technique is difficult to establish because of the great variations of the wound. I prefer Cranwell's trap door opening, with the base above. Resection of one rib is certainly often sufficient, and it is seldom that the incision need extend above the eighth rib in front, or the seventh rib behind.

DISCUSSION OF THE PAPERS OF DRS. McGLANNAN, CULLEN AND DAVIS

Dr. Stuart McGuire, Richmond, Virginia.—In connection with the paper of Dr. Davis I desire to report two cases of diaphragmatic hernia which have occurred in my practice during the last eight months.

The first case was a boy, nineteen years of age, who was hurt in a bar-room quarrel He was struck in the abdomen with a beer bottle and felled to the floor. His antagonist then jumped on him with his knees in his abdomen and stabbed him with a pocket knife, first in the neck, then on the upper part of the arm, and finally through the third intercostal space on the left side. The patient bled profusely from the wounds, vomited blood and later passed much blood by bowel. The incisions were sutured without an anesthetic and the patient put to bed. For three days he was unconscious. He finally began to slowly improve, but for three weeks he could take no food by mouth and had to be sustained by nutritive enemata. He then became able to swallow and retain liquids. If he attempted to eat solids, however, he experienced a sensation as though the food stopped before it reached the stomach, and he would spit or vomit it up shortly after swallowing it.

Four months later when the patient was brought to me he was very weak and anemic and had lost about fifty pounds in weight. Physical examination of the chest showed the heart markedly displaced to the right and a tympanitic percussion note with absence of breath sounds from the fifth rib down on the left side. An attempt was made to pass a stomach tube but it met with a complete block 17½ inches from the incisor teeth.

A mixture of bismuth and buttermilk was given slowly and after about eight ounces were introduced into the stomach several radiograms of the abdomen were made and it was found that he had diaphragmatic hernia with escape of practically the entire stomach into the left thoracic cavity.

An operation was advised and agreed to. It was determined to adopt the transpleural rather than the abdominal route, as it was believed that the adhesions between the stomach and the viscera of the chest were so strong and numerous that they could not be safely separated except under direct inspection.

The patient was placed on the table in the reverse Trendelenburg position in order to minimize the possible shock from the sudden admission of air into the pleura.

The incision was made after the method suggested by Cranwell. The lower and lateral part of the thorax was opened by a flap having its base above, consisting of the whole thickness of the chest wall and containing about five inches of the eighth and ninth ribs. As soon as the parietal pleura was opened the stomach presented itself. There were numerous adhesions between it and the pericardium and collapsed left lung. These were carefully separated, several attachments requiring preliminary ligature.

A very dense and firm adhesion was found between the cardiac end of the stomach and the lateral surface of the chest wall just opposite the stab wound. This was peeled loose after considerable effort and there was at once the escape of some stomach contents. The stomach was delivered through the opening into the thorax and an incision three inches long found on its anterior surface beginning near the esophageal opening and extending in the direction of its greater curvature. The edges of this incision did not bleed and showed evidences of cicatrization, hence it seems reasonable to believe that the rupture of the diaphragm and hernia of the stomach resulted from the blow and injury inflicted on the abdomen prior to the cutting, and that when the stab wound was made in the third intercostal space the vulnerating instrument cut the stomach which was already in the left thoracic cavity.

The opening just described in the stomach was sutured in the usual way, and then the adhesions to the stomach where it passed through the diaphragm were separated, and the stomach replaced in the abdomen.

The rupture in the diaphragm was about four inches in length, beginning near the esophageal opening and extending through the left leaf toward the sternum. The tear was repaired with two tiers of chromic catgut sutures. A rubber drain was then placed in the pleural cavity and the opening in the chest wall closed. Liquid nourishment was given the following day. At the end of a week the patient was placed on general diet and from the first swallowed and retained solid food without difficulty.

He gained weight at the rate of a pound a day and left the hospital in four weeks after the operation. A radiogram taken

just before the patient was dismissed showed the stomach in its normal position, the heart almost back in its proper place, but the collapsed lung not yet fully expanded.

My second case of diaphragmatic hernia was operated on ten days ago and the man is still in the hospital. The patient stated that seven months ago while working on a roof a rope broke and he fell a distance of thirty-four feet. He was unconscious for two hours. On examination it was found that he had fractured both bones of his forearm, injured his left hip and received numerous cuts and bruises. He suffered with pain and soreness in the epigastrium and hiccoughed for three days. There was nausea but no vomiting. Patient was confined to bed for six weeks. He had little appetite and what he ate caused distress.

In July he came to Richmond and entered a hospital in order to have the bones of his arm reset. The surgeon in making his general examination, recognized the presence of a diaphragmatic hernia and confirmed his diagnosis by an *x*-ray plate. The patient was operated on for the vicious union of the bones of the forearm but declined to have anything done for the rupture of his diaphragm. He returned home, but suffered so much from indigestion and shortness of breath that he finally came to me for surgical relief.

Physical examination showed the left chest larger than the right. There was hyper-resonance from the fourth rib down, and peristaltic sounds were plainly audible. An *x*-ray plate made after a bismuth meal showed practically the entire stomach in the left pleural cavity. The patient had lost twenty pounds in weight but was otherwise in good general condition.

The patient was placed on the table in the reverse Trendelenburg position and the left thoracic cavity opened by Cranwell's incision. As soon as the pleura was opened and the negative pressure relieved, the stomach and other herniated viscera returned to the abdomen. The left lung was completely collapsed. There was a tear in the diaphragm about five inches long, extending from the left margin to the esophageal opening. The liver, spleen and other abdominal organs could plainly be seen. There were no adhesions except between the margins of the hernial opening and the great omentum, and these were easily separated.

The tear in the diaphragm was repaired with chromicized catgut sutures, and the incision in the chest wall closed without drainage.

The patient is now on general diet and states that he is completely relieved of his former digestive disturbance, and also that "it is a great satisfaction to feel the food go to the proper place."

In looking up the literature on diaphragmatic hernia I found the best article written on the subject was by Giffin, of the Mayo Clinic, published in the *Annals of Surgery* for March 1912. At the time Giffin wrote this paper there were but fifteen cases of diaphragmatic hernia on record which had been recognized during life. Other cases had doubtless been operated on and not recorded at the time these statistics were compiled and since the routine use of the *x*-rays the condition is diagnosticated much more frequently. The total number of cases is still small and it is therefore remarkable that Dr. Davis should be able to report five cases, and that I should report two at this meeting.

In conclusion, I wish to present *x*-ray pictures of my two cases taken before and after operation.

Dr. S. M. D. Clark, New Orleans, Louisiana.—In reference to the ectopic reported by Dr. Cullen, I had occasion four or five years ago to report to my State Medical Society a case presenting points quite similar. This woman walked into the Clinic, saying that she had been picking bones out of her umbilicus for the past eighteen months, and only recently had she experienced any trouble when one of the bones proved to be so large that she could not extract it. She gave a typical history of previous ectopic and said that she fully expected to bear a child when suddenly she ceased to feel life, followed by reduction in size of her abdomen. About six months after this, the first bone appeared at the umbilicus. Each bone had been preserved, she bringing with her a large bottle filled with the many that had been picked out of the navel. It was necessary to give her an anesthetic, when the opening was enlarged sufficiently to extract the femur which was engaged; at this time, the pouch was explored and found to have an hour-glass contraction. Below the contraction was found the cranial bones which were delivered with no special difficulty. An iodoform wick was left in the pocket and removed on the third day. At this time the nurse reported that when giving an enema she noticed that much of it would come through the outlet at the umbilicus. In a few days this sigmoid communication closed spontaneously and the case recovered without further incident. This case beautifully illustrates nature's wonderful powers of

repair and ability to cast off foreign bodies. Here there is no doubt but that a point of exit for the cranial bones was near at hand by way of the sigmoid and the other bones were being eliminated by way of umbilicus. I reconstructed the skeleton of the fetus and determined that it died when about six months old.

Dr. Gordon K. Dickinson, Jersey City, New Jersey (by invitation).—Just a slight correction of Dr. McGlannan's paper. If I am correctly informed, in the Groesich operation you make an incision in one rectus sheath on top and under the other, producing two long flaps that are brought together, and the operation described by Dr. McGlannan is the Maydl, which I have done for seven years, and of which I think very highly.

Dr. Henry O. Marcy, Boston.—Dr. McGlannan's paper has interested me very much, because I have had many large hernias under supervision from time to time. I have lost two patients simply from intra-abdominal pressure. I have taken the usual care that is exercised in dealing with these cases, and yet in attempting to reduce or to return the hernia and close, the pressure and circulation were such, although the patients were in good general vigor, they both died.

In the matter of so-called ideal closure of ventral hernia or umbilical hernia, I have long since devised splitting laterally the sides in this fashion and suturing in two layers in that way (indicating). It works nicely, it is easy of application, and is well worthy of being recommended to you.

Dr. W. P. Carr, Washington, D. C.—I want to report a case of diaphragmatic hernia I saw several years ago which illustrates the difficulty in diagnosis where it has to be made immediately. This man had a large stone rolled on him in a stone quarry, which weighed nearly a ton. It doubled him up like a jack-knife. He was brought into the hospital badly shocked. I examined his chest carefully and I thought he had a fractured rib, punctured lung, and pneumothorax. He did not live more than half an hour after he was admitted to the hospital. There was no chance for any *x*-ray examination or extensive examination of any kind. We tried to get him over the shock, thinking the trouble was a pneumothorax.

At the autopsy we found the entire stomach in the thoracic cavity and enormously dilated with gas, so that not only the percussions sounds but all the physical signs were those of pneumothorax.

Dr. Howard A. Kelly, Baltimore.—I recall a case twenty-five years ago dying in Philadelphia from stuffing back an enormous umbilical hernia; the patient undoubtedly died from the pressure. The proper procedure in such a case would be simply to slit the linea alba down, and make the hernia larger instead of trying to get rid of it. It is best to associate a wide lipectomy with the operation for hernia where a patient is stout; this not only relieves the patient of the great burden of fat, but it gives a splendid exposure of all surfaces on which we want to operate. I call this my watermelon operation. One could spend several hours talking about all of the different plans advised before Dr. Mayo's operation; their number shows their futility; now they are all gone into the surgical waste basket and the overlapping from above down remains.

In a large hernia I am in the habit of splitting across the fascia to the outside of the rectus muscles and undermining above and below. In this way I get a lift from the sides which is better I think in some cases than simply pinching together the hernia at the angle and in the middle. It is like lifting up the flap of the farmer's barn door pants, Joseph Price used to talk about.

One thing has especially interested me in these cases, and that is, in the middle of the thick fat I always find a strong layer of fascia, which affords a splendid hold for the sutures. This is not described as I find it in our anatomies.

I like to use a few silk ligatures at long intervals; they never do harm. I then use catgut in between them and so get a good closure. So far I have not seen a single wound break down.

Dr. J. Shelton Horsley, Richmond, Virginia.—In removing a mesenteric cyst sometimes injury is done to the branches of the mesenteric artery and it may seem necessary to resect the bowel. In some experiments which I reported two years ago before this association, we devascularized certain sections of the bowel by doubly ligating and cutting the mesentery close to the bowel and found that if the omentum was sutured snugly around this devascularized segment no gangrene would occur. This was the case even when both ends of the devascularized segment were occluded by tape ligature. As much as four inches of the bowel can be taken care of in this manner. Such a procedure may be valuable when an operation has necessarily been prolonged and injury to the mesenteric vessels brings up the question of resecting the bowel.

In large hernias I have used with much satisfaction the overlapping method recommended by the Mayos. The peritoneum and thin fascia can be utilized in this way instead of being excised. Recently Mann, of Minnesota, has transplanted the fascia lata to reinforce the hernia when the structures seemed weak.

Dr. McGlannan (closing the discussion on his part).—Sometimes with a relatively small hernia in a fat person, you can remove by the watermelon incision, a piece of fat big enough to expose the limit of separation of the recti. The limit of this separation must be exposed and then starting above the muscle is brought over to join the muscle of the other side. The overlapping of the fascia, from side to side and also from above downward is another strong support.

Dr. Cullen (closing the discussion).—It is remarkable how nature takes care of foreign matter. In this connection I would like to refer to a patient in Bohemia, who, if I remember rightly, was sentenced to imprisonment for life for murder. She claimed she was pregnant. The law of the land said that no woman who is pregnant shall be kept in prison. The physician who examined her said she was not pregnant. The woman was incarcerated for thirty years, at the end of which time she developed a slow fever and died. At autopsy, in what remained of the right Fallopian tube they found a packet of bones with an abscess around it. There had been a tubal pregnancy at the time of her incarceration. Mummification had taken place and at the end of thirty years death occurred. Here was an illustration of nature successfully walling off an extra uterine pregnancy for many years. This case Dr. George L. Wilkins and I referred to on page 119 of the Johns Hopkins Hospital Reports 1896.

Several years ago I saw a colored woman in Cambridge, Maryland. A few months before she came under observation she was supposed to be five or six months pregnant. While lifting a large tub she felt something give way and there were no further signs of pregnancy. When admitted to the hospital there was a discharge of dark watery fluid through the umbilicus. This proved to be liquor amnii. I enlarged the umbilical opening and removed the fetus. In this case the uterus had ruptured and the amniotic sac had become adherent to and opened at the umbilicus. In this case I did not get into the general abdominal cavity.

THE KINETIC THEORY OF PERITONITIS

By George W. Crile, M.D.
Cleveland, Ohio

It is my purpose in this paper to present a new explanation of the phenomena which accompany peritonitis and to outline the treatment suggested by this conception.

In the abdomen the leading symptoms of peritonitis are pain and tenderness, distention, muscular rigidity, intestinal paresis, vomiting. In addition to these local disturbances there are also the general symptoms of infection—accelerated pulse and respiration, raised blood-pressure, fever and rapid loss of strength and weight. I postulate that these are all adaptive phenomena—that is, that each individual phenomenon of peritonitis has been evolved for the good of the individual. In other words, the whole process is for the purpose of defense against injury just as truly as physical fighting is for the purpose of defense against attack. In like measure, physical fighting and the body's defense against peritonitis are dependent on the transformation being effected by the kinetic system. In peritonitis as in the case of a physical attack the defense may require so rapid and so extensive a transformation of the body's stores of energy that exhaustion or death even may follow. It follows, therefore that in peritonitis, as in fighting or in any form of physical exertion, safety may lie in the control of the kinetic system.

Analysis of the Phenomena of Peritonitis. As the abdomen has within it a germ-laden intestine, and as it

was a part of the body that was frequently wounded in man's phylogenetic struggles with his environment, the peritoneum, perforce, through natural selection acquired a remarkable power of self-defense against the consequent infections. As an infection is most readily spread and increased by movement, immobilization is the prime requirement in overcoming an infection. Within the abdomen this immobilization is accomplished (*a*) by inhibition of the intestines; (*b*) by distention of the intestines; (*c*) by rigid and persistent contraction of the abdominal muscles and (*d*) by the exudation of a sticky, glue-like material. The infected point in the peritoneum may therefore be completely fixed (*a*) by paralysis, (*b*) by distention, (*c*) by rigidity of the abdominal wall and (*d*) by gluing.

On account of the intestinal inhibition, digestion and absorption cease and anorexia and vomiting follow—self-protective measures which have been evolved against the danger from poisonous, broken-down food.

We see, therefore, that the paralytic distention of the intestines, the muscular rigidity of the abdominal walls, the anorexia and the vomiting which accompany peritonitis are natural adaptations for the purpose of localizing and overcoming the infection. As for the pain and tenderness, they are part of the protective mechanism and play their role by forcing the body to maintain a boxlike rigidity of the abdominal portion.

When the abdomen is rigid it can no longer play its important respiratory role, and the respiratory movements are confined to the thorax—in fact, the lower thoracic movements also are inhibited, since the movable ribs are fixed on the abdominal side. As the lungs are but partially filled, the respiratory rate is increased to compensate for the diminished volume of the exchanged gases. The diminished respiratory movements of the lower chest induce vascular congestion; vascular congestion induces pleurisy and pneumonia.

The loss of water by vomiting, the diminished intake of

water, and the failure of water absorption cause a rapid shrinkage of the soft parts which is especially noted in the face, while the increased blood supply to the intestines combined with the diminished intake of water causes a rapid diminution of the pulse volume. The loss of water is followed also by a diminished volume of urine. At the same time metabolism is increased—there is an increased concentration of solids which cannot be eliminated by the kidney handicapped as it is by the diminished urinary output. The skin, in turn, therefore is forced to attempt by increased activity to compensate for the renal insufficiency.

We see therefore that the *characteristic* phenomena of peritonitis are as natural as the phenomena of walking, running or fighting. The increased pulse and respiratory rate and the fever are characteristic not of peritonitis alone but of all infections. They are the result of the *forced* conversion of potential energy into kinetic energy as a defense. This defense also is an adaptation developed in the body by natural selection and is the means by which foreign proteins—infection products—are broken down.

The Treatment of Peritonitis. If the body-wide disturbances caused by peritonitis are adaptations for defense, then we must conclude that death is caused by an excessive discharge of the body's store of energy in maintaining this defense. Our problem, therefore, must be to discover some means by which the method of defense evolved by nature may be maintained, while at the same time the energy of the body is conserved as far as possible.

The evidence upon which we base our postulate, that the excessive transformation of potential into kinetic energy is the cause of death in peritonitis, points the way to the method by which the energy may be conserved:

(*a*) In experimental researches my associates—Drs. J. B. Austin, H. G. Sloan, F. W. Hitchings, and M. L. Menten—and I have found that infection produces in the brain, the suprarenals and the liver histologic changes which are

identical with the changes which are characteristic of exhaustion from any cause—running, fighting, trauma, etc. Exhaustion from any cause, as we have shown elsewhere, is invariably accompanied by widespread histologic changes in these three organs—the brain, the suprarenals, and the liver—these changes, according to the degree of exhaustion, varying from slight hyperchromatism, through stages of chromatolysis, to a final stage of disintegration.

(*b*) Our experimental researches have shown us also that deep morphinization prevents the histologic changes which are characteristic of the excessive conversion of energy—that is, of exhaustion.

Not only is the conversion of energy excessive in cases of peritonitis but, as we have stated already, the intake of energy in the form of food fails, so that the stores of energy are depleted with great rapidity, while the action of the kinetic system is still further impaired by the loss of water equilibrium.

These facts point the way to two prime requisites in the treatment of peritonitis, (*a*) the conservation of energy by the use of morphin and (*b*) the maintenance of the water equilibrium by the Murphy rectal drip.

Morphin not only protects the organs but it also aids in promoting the efficiency of the defense mechanism within the abdomen—for deep morphinization of itself causes inhibition of the intestine; immobilizes the patient as a whole; prevents pain; and holds metabolism practically at a standstill. Under deep morphinization but little food is required; the brain, suprarenals, and liver are protected; and the intestines are immobilized while the phagocytes overcome the infection.

That deep opium narcotization is an efficient treatment for peritonitis was well known to the elder clinicians, especially to Alonzo Clark and to Flint, who gave opium until the respirations were far below normal—as low even as ten or twelve per minute.

The appearance of these patients would seem to indicate that they are perilously near death; in reality they are in a condition which closely resembles hibernation, and which continues until the local immunizing forces overcome the infection.

In cases of appendicitis with spreading peritonitis the surgeon should never in the whole scheme of treatment lose sight of this prime need of protecting the kinetic system from exhaustion. The administration of morphin should therefore begin at once. Nitrous oxid is the inhalation anesthetic of choice, as ether by dissolving the lecithin in the phagocytes causes a weakening of the body's defense which may last from twenty to twenty-four hours—a break in the defense which may cost the life of the patient. The operation is performed under anociation, the local field being blocked as far as the zone of actual infection. Morphin is continued during and after the operation as it is required to conserve the patient's energies.

My associate, Dr. Lower, and I have employed this method in 391 cases of acute appendicitis with but two deaths.

We may define peritonitis as the adaptive phenomenon manifested by the kinetic mechanism in maintaining a defense against an infection of the peritoneum, and we find that the kinetic theory supplies a consistent explanation of the phenomena of peritonitis and also a true index to its successful treatment.

ALKALESCENCE, ACIDITY, ANESTHESIA: A THEORY OF ANESTHESIA

By George W. Crile, M.D.
Cleveland, Ohio

Alkalies and bases compose the greater part of the food of man and animals, the blood of both man and animals under normal conditions being slightly alkaline or rather potentially alkaline; that is, although in circulating blood the concentration of the OH-ions—upon which the degree of alkalinity depends—is but little more than in distilled water, yet blood has the power of neutralizing a considerable amount of acid (Starling, Wells). At the time of death, whatever its cause, the concentration of H-ions in the blood increases—the concentration of H-ions being a measure of acidity—that is, the potential or actual alkalinity decreases and the blood becomes actually neutral or acid.

To determine what conditions tend to diminish the normal alkalinity of the blood, many observations were made for me in my laboratory by Dr. M. L. Menten to determine by electrical measurements the H-ion concentration of the blood under certain pathologic and physiologic conditions.

As a result of these researches we are able to state that the H-ion concentration of the blood—its acidity—is increased by excessive muscular activity, excessive emotional excitation; surgical shock; in the late stages of infection, by asphyxia, by strychnin convulsions, by inhalation anesthetics; after excision of the pancreas, and in the late stages

of life after excision of the liver and after excision of the adrenals; morphia and decapitation cause no change in the H-ion concentration. Ether, nitrous oxid and alcohol produce an increased acidity of the blood which is apparently proportional to the depth of anesthesia.

Many of the cases studied were near death, as would be expected, since it is well known that a certain degree of acidity is incompatible with life.

Since alkalies and bases preponderate in ingested food; since alkalinity of the blood is diminished by bodily activity; and since at the point of death the blood is always acid, we may infer that some mechanism or mechanisms of the body were evolved for the purpose of changing bases into acids that thus energy might be liberated.

These observations lead naturally to the question: May not acidity of itself be the actual final cause of death? We believe that it may be so from the facts that (1) the intravenous injection of certain acids causes death quickly, and (2) the intravenous injection of acids causes extensive histologic changes in the brain, the adrenals and the liver which resemble the changes invariably caused by excessive activation of the kinetic system. In view of these facts may we not find that anesthesia and many instances of unconsciousness are in fact phenomena of acidity?

As has been stated already we have found that the H-ion concentration of the blood—its acidity—is increased by alcohol, by ether and by nitrous oxid. In addition our tests have shown that under ether the increase of the H-ion concentration—acidity—is more gradual than under nitrous oxid, an observation which accords well with the fact that nitrous oxid more quickly induces anesthesia than does ether.

Further striking testimony in favor of the hypothesis that the production of acidity by inhalation anesthetics is the method by which anesthesia itself is produced is found in the fact that although the lethal doses of acid cause

muscular paralysis yet this paralysis may be mitigated by adrenalin—which is alkaline. This observation may explain in part the remarkable success of the method of resuscitation devised by me, in which animals "killed" by anesthetics and asphyxia are revived by the use of adrenalin.

In animals under inhalation anesthesia Williams found that no nerve current could be detected by the Einthoven string galvanometer, a fact which might be explained by postulating that nerve currents can flow from the brain to the muscles and glands only when there is a difference of potential. Any variation from the normal alkalinity of the body must change the difference in potential. Since the nerve currents in animals under anesthesia are not demonstrable by any apparatus at our command, and since anesthesia produces acidity, then we may infer that acidity reduces the difference in potential. As long as there is life, a galvanometer of sufficient delicacy would perforce detect a nerve current until the acidity increased to such a point as to reduce the difference in potential to zero—the point of death. If at this point a suitable alkali—adrenalin solution—can be introduced quickly enough, the vital difference in potential may be restored and the life processes will be renewed. Bearing especially on this point is the fact that if adrenalin in sufficient quantities be administered simultaneously with an acid it will not only prevent the fall in blood-pressure usually caused by the acid, but will also prevent the histologic changes in the brain, adrenals, and liver which are usually caused by the intravenous injection of acids.

This hypothesis regarding the cause of anesthesia and unconsciousness explains and harmonizes many facts. It explains how asphyxia, overwhelming emotion and excessive muscular exertion, by causing acidity, may produce unconsciousness. It explains the acidosis which results from starvation, from uremia, from diabetes, from Bright's disease, and supplies a reason for the use of intravenous

infusions of sodium bicarbonate to overcome the coma of diabetes and uremia. It may explain the quick death from chloroform and nitrous oxid; and may perhaps show why unconsciousness is so commonly the immediate precursor of death.

One of the most noticeable immediate effects of the administration of an inhalation anesthetic is a marked increase in the rapidity and force of the respiration. The respiratory center has evidently been evolved to act with an increase of vigor which is proportional—within certain limits—to the increase in the H-ion concentration—whereas the centres governing the voluntary muscles are inhibited. In this antithetic reaction of the higher cortical centres and the lower centres in the medulla to acidity we find a remarkable adaptation which prevents the animal from killing itself by the further increase in acidity which would be produced by muscular activity. That is, as the acidity produced by muscular action increases and threatens life, the respiratory action, by which carbon dioxid is eliminated and oxygen supplied, is increased, while the driving power of the brain, which produces acidity, is diminished, or even inhibited entirely; that is, the state of unconsciousness or anesthesia is reached. We conclude first, that without this life-saving regulation, animals under stress would inevitably commit suicide; and second, that it is probable that the remarkable phenomenon of anesthesia — the coincident existence of unconsciousness and life—is due to this antithetic action of the cortex and the medulla.

Within a few seconds after beginning nitrous oxid anesthesia the acidity of the blood is increased. This rapid acidulation is synchronous with almost instantaneous unconsciousness and increased respiration. If the oxygen in the inhaled mixture be increased a decrease in acidity is again synchronous with lighter anesthesia, and a decrease in the respiratory rate.

If these premises be sound, we are justified in stating

that the state of anesthesia is due to an induced acidity of the blood. If the acidity be slight, then the anesthesia is slight and the force of the nerve impulses is lessened but the patient is still conscious of them. As the acidity increases, associative memory is lost, and the patient is said to be unconscious; the centres governing the voluntary muscles are not inhibited however, and cutting the skin causes movements. If the acidity is further increased there is loss of muscular tone and even the strong contact ceptor stimuli of a surgical operation do not cause any muscular response and finally the acidity may be increased to the point at which the respiratory and circulatory centres can no longer respond by increased effort—and anesthetic death—that is *acid* death—follows.

Against this postulate stands the fact that an infusion of sodium bicarbonate does not overcome inhalation anesthesia. How valuable this fact may be—I do not know. Certain clinical phenomena are clarified by this postulate and serve to substantiate it. For example, it is well known that inhalation anesthesia precipitates the impending acidosis which results from starvation, from extreme Graves' disease, from great exhaustion, from surgical shock and from hemorrhage, and which is present when death from any cause is imminent.

We see therefore that anesthesia is made possible—first—by the fact that inhalation anesthetics cause acidity, and second—by the antithetical adaptation of the higher centres in the brain and of the centres governing respiration and circulation.

In deep contrast to the action of inhalation anesthetics is that of narcotics. Deep narcotization with morphin and scopolamin is induced slowly; the respiratory and pulse rates are progressively lessened—and there is no acidity.

By our researches we have established in what consists the generic difference between inhalation anesthetics and narcotics. In our experiments no increase in the H-ion

concentration was produced by morphin or by scopolamin—no matter how deep the narcotization. In animals already narcotized by morphin, the production of acid by any of the acid-producing stimuli was delayed or prevented. On the other hand, in animals in which an acidity had already been produced by ether, by shock, by anger, or by fear—the later administration of morphin delayed or inhibited entirely the neutralization of the acidity. In other words morphin interferes with the normal mechanism by which acidity is neutralized possibly because its inhibiting action on the respiratory centre is sufficient to overcome the stimulating action of acidity on that centre, for as we have stated, the neutralization of acidity is in large measure accomplished by the increased respiration induced by the acidity itself.

Summary. Acidity inhibits the functions of the cerebral cortex; but stimulates those of the medulla. This antithetical reaction to the stimulus of increased H-ion concentration is an adaptation to prevent animals from committing suicide by over-activity, since the mechanism, for the initiation and control of the transformation of energy is in the higher centres of the brain, while an essential part of the mechanism for the neutralization of acidity—the centres governing circulation and respiration—is in the medulla. This explains many clinical phenomena—why excessive acidity causes paralysis; why there is great thirst after inhalation anesthesia, after excessive muscular activities, excessive emotion—after all those activities which we have found to be acid-producing, for water—like air—neutralizes acids. The excessive use of alcohol, anesthetics, excessive work, intense emotion all produce lesions of the kidney and of the liver. The explanation may be in the fact that all these stimuli increase the acidity of the blood, and that if long continued the neutralizing mechanism must be broken down, and so the end-products of metabolism are insufficiently prepared for elimination.

In view of these considerations we may well conclude that the maintenance of the normal potential alkalinity of the blood is to be estimated as the keystone of the foundation of life itself.

DISCUSSION

Dr. J. Garland Sherrill, Louisville, Kentucky.—Dr. Crile has given us the benefit of some excellent work. His first few remarks about peritonitis remind me of the position I took years ago on the subject of peritonitis, and I have taken back some of the things I said at that time.

At the Birmingham meeting of this Association some of you will doubtless remember that I presented a paper on this subject with a view to crystallizing the work in the way of treating this disease. At that time some of the men were scrubbing off the intestines with gauze, some were washing out the abdomen, some were not washing out the abdomen, and others were using the Fowler position, etc. With a view to crystallizing that work and of getting a basis on which we could all stand, I presented that paper. Since that time our work in appendicitis, with peritonitis following it, has become practically the same everywhere in this country. We are all employing proctoclysis; we are all employing gastric lavage; we are all employing the Fowler position after the operation, and in cases where we cannot operate promptly we employ it before, and our patients are getting well. In those days the mortality was as high as seventy per cent. When Murphy presented his report of twenty-eight cases of acute perforative spreading peritonitis without a death, many members in the audience were inclined to doubt his record, but since that time we have all become firmly convinced he was stating the facts. With the improved plan of treatment we have all been getting much better results. However, I question very much whether Dr. Crile's plan of narcotizing these patients with opium will add anything to our results. I am inclined to think it will do harm. The treatment usually employed by most of us, I think, is that if the patient is restless, cannot sleep, we administer sufficient opium to keep him quiet. Taking Dr. Crile's own theory, if acidosis is already present, or if the patient has developed acidosis, morphin prevents the patient from rallying from the acidosis. So taking his own

statement, I am inclined to doubt the efficiency of these large doses of morphin. In my own practice the best thing I have been able to add to the proctoclysis and the Fowler position has been gastric lavage, repeated as frequently as necessary, and to let the intestinal tract alone as far as moving the bowels is concerned.

Dr. James E. Thompson, Galveston, Texas.—It is with great pleasure that I have listened to Dr. Crile's remarks on the subject of acidosis. A few years ago I happened by chance to obtain possession of a book, the perusal of which gave me the greatest satisfaction. The title of the book is "The New Physiology in Medical and Surgical Practice," written by A. Rendle Short. The perusal of this book will be a revelation to the majority of busy surgical practitioners. I usually keep a number of these books on hand, which I send to my dearest friends as Christmas presents.

The chapter of acidosis is probably one of the strongest in this book. After reading it, I found that it was necessary to revolutionize my practice in the treatment of surgical patients. I now have almost reached a point of treating my post-operative cases in a routine manner with rectal enemata of glucose. The reason of this is self evident. A large number of these patients have suffered from nausea and vomiting before the operation, and a still larger number suffer from the same symptoms afterward. They are unable to take nourishment, and are unable to absorb anything by way of the stomach. As time passes the tissues begin to demand carbohydrates, particularly sugars. The only way they can obtain this is by splitting themselves up. This process is attended by the formation of acetic and diacetic acid. In other words a condition of acidosis inevitably results; producing very severe and often fatal symptoms. After sugars are given by the rectum, ante- and post-operative acidosis can in a great measure be prevented. The most suitable way of giving these sugars is to use rectal enemata, containing glucose or dextrose. In very severe cases, the glucose solution can be given intravenously.

Dr. Richard A. Barr, Nashville, Tennessee.—Did I understand Dr. Crile to say that peritonitis killed by acidosis?

Dr. Crile.—No.

Dr. Barr.—I want to say, I was very glad to hear Dr. Crile state his position on the subject of the use of morphin in the use of peritonitis, because for a number of years I have used it

constantly, and I have always understood it interfered with leucocytosis and phagocytosis. To that extent it would be contra-indicated in infective processes. I have felt it was beneficial in peritonitis, and I am glad Dr. Crile has proved its beneficial influence in preventing pathologic changes in the brain and liver.

Dr. Sherrill I think is wrong in his position that patients with peritonitis or beginning peritonitis should be put in the Fowler position before operation, unless he will qualify that by stating this should be done only when the focus of infection is below the level of the umbilicus. Patients with perforative acute gastric or duodenal ulcers should not be set up before operation.

A few years ago I read Short's Physiology, and I agree with the last speaker that it is a very satisfactory book, and I have been using the rectal injections of glucose, or more lately dextrose, and we have had the same trouble with rectal instillations of glucose that you have with any other fluid taken in that way. Sometimes it is not taken up. The glucose or dextrose may be given intravenously in a concentration as high as thirty-three and one-third per cent. Lots of these cases of septic peritonitis are wonderfully improved by the intravenous injection of glucose or dextrose in low percentage, say three to five per cent.

I have felt, too, it was proper to give morphin in acute abdominal conditions before a definite diagnosis was made. It is ordinarily emphasized that an opiate should not be given in an acute intra-abdominal condition unless the diagnosis is made. To my mind an opiate is more or less essential for diagnostic purposes. These patients are suffering and they cannot be satisfactorily examined, and I believe it is often necessary and often of advantage to give an opiate beforehand, and in the light of Dr. Crile's experiments, it is not only an advantage in diagnosis, but it is an advantage to the patient so far as the effect of the anesthetic is concerned, and oftentimes so far as the patients themselves are concerned.

Dr. W. P. Carr, Washington, D. C.—I have heard a little about Dr. Crile's theory before, I have been thinking about it for some time, and I do not know just how far to accept the theory of acidosis as a cause of anesthesia. He certainly brought out strong evidence in that direction and has given us something to think about.

I have always been a believer in the good effects of morphin

before operation and after operation when it is necessary to relieve pain or to keep the patient comfortable. My internes in the Emergency Hospital are most enthusiastic in the use of morphin to relieve shock. They are even more enthusiastic about it than I am, and we believe we save a great many lives in that way. According to the hypothesis of Dr. Crile, there is no objection of giving morphin before the anesthetic, although it may delay somewhat the getting rid of the acidosis afterward. When the patient becomes conscious, the acidosis has already been gotten rid of to a sufficient extent for us to give morphin if it is necessary to make him comfortable and keep him quiet. This may delay further elimination of acid, but this is probably insignificant in comparison to the good it does in preventing the further increase of acid from psychic and physiologic causes. I think Dr. Crile's work is of great importance and hope he will be able to carry it much further in the near furture.

Dr. James A. Danna, New Orleans, Louisiana.—I do not want to venture before this body an opinion that is going to startle any one, but I was delighted to hear Dr. Crile say what he did in regard to the use of morphin. I have had in our local medical society some hot arguments with some of our members in regard to the free use of morphin in septic conditions, and in acute inflammatory conditions of the abdomen particularly. I have had these arguments because I have seen a practical demonstration from the use of morphin in all acute abdominal conditions that come to me when I first see them, or tell the nurse to give morphin for its physiological effect, give it freely until the patient is relieved of any discomfort or any pain. So much for the acute cases before operation.

My patients after operation very seldom have any of the after discomforts that most patients have, and again I attribute it, after hearing Dr. Crile's remarks, to the fact that I insist upon the patient getting full physiological doses of morphin, particularly where there has been considerable traumatism of the abdomen, immediately after he, or she, as the case may be, wakes up from the anesthetic. I do not want to see them kick and complain. When they do that, I give them enough morphin to make them comfortable.

I am delighted to have heard Dr. Crile's remarks and to know that I have been working on a physiological foundation.

Dr. W. R. Jackson, Mobile, Alabama.—I want to ask one or two questions. First, would not nitrous oxid or oxygen inhaled produce acidosis or an acid brain, or whether the exclusion of air altogether by the occlusion of the respiratory tract would not do the same thing? If so, would not these inhibitions be the cause of the acidosis by excluding oxygen or normal air, instead of the narcotizing effect of the drug itself? Second, I would like to ask the doctor what is the purpose of the soda solution by proctoclysis, and how it tends to make more alkaline the blood?

Dr. Crile (closing the discussion).—I do not think I made the point clear to Dr. Sherrill that the body had a wonderful power of neutralizing acids and it only fails toward the time of death. In peritonitis we have made tests of the normal alkalescence which existed, and it is surprising to what extent the mechanism or retention of the acidity is obtained.

Answering Dr. Jackson, asphyxiation produces acidosis immediately, and as a matter of fact, what surprised me and pleased me at the same time was the fact that we could tell approximately the extent of the acidity by what? By the color of the blood. The dark blood is always acid blood. We have learned in our clinical work not to use morphin when the blood is dark. Sodium bicarbonate does this.

I would suggest that you read the work of Lawrence Henderson. He is a physiological chemist. He has taken the acidity of the body blood and urine. We shall find in the work of physiological chemists a line of thought and investigation of great interest along the lines I have suggested, and the purpose of my paper was not to present it to you in the nature of a finished product, but to bring to you some of the things I have been thinking about.

Dr. R. S. Hill.—Have you had any experience in giving large quantities of water before an operation?

Dr. Crile.—We load patients with water before operation. In the presence of acidosis we give it subcutaneously. We have had ninety-two acute cases of peritonitis, with two deaths, but we only morphinize the bad cases we are afraid of losing.

GALL-STONES DURING THE COURSE OF 1066 ABDOMINAL SECTIONS FOR PELVIC DISEASE

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After some years of discussion it now seems to be the consensus of opinion that the appendix should be inspected when the abdomen is opened by the lower abdominal incision, unless the nature of the pelvic disease would endanger the patient, were the uncontaminated peritoneum investigated. Although the operator has every reason for believing that the contents of a pyosalpinx are sterile, he would not feel justified in inspecting the appendix for fear of carrying infection to another part of the abdomen. This rule would be disregarded in case the appendix were situated below the brim of the pelvis, below the gauze packing used to protect the upper abdominal peritoneum.

If the appendix looks pathologic or if the history shows attacks of pain in the right iliac fossa, probably appendiceal in origin, the appendix is removed so that the patient may be spared another operation. Some operators go so far as to remove every appendix when the abdomen is opened for other purposes, on the ground that the additional operative procedure does not carry with it any increased mortality and that the patient has the right to expect that she will not be subjected at some future time to disease originating in this troublesome organ.

Shall the same kind of reasoning, then, be applied to the gall-bladder when the abdomen is opened for pelvic disease? In many respects the cases are parallel. Neither class of patients wants to be put to the inconvenience or expense of a second operation, if the disease or what may result in disease in the extrapelvic portion of the abdomen can be cared for at the same operation. If gall-stones have given symptoms, either as indigestion or "gastralgia" or distinct attacks of gall-stone colic, the patient will not recover her health, even after the most skilful pelvic operation, if the gall-bladder be not attended to for existing disease or calculi. She has the right, therefore, to demand of the surgeon that, so far as possible, all of her pelvic and intra-abdominal derangements be cured at one and the same operation. To the surgeon is left the question of what constitutes disease of the gall-bladder or dangerous conditions so far as the pelvis be concerned and under what conditions will he be justified in exploring the gall-bladder region through the lower abdominal incision. Also after exploration he will have to decide whether further operative procedures be necessary and finally the nature of the operation to be performed in each individual case.

In the present paper it is proposed to discuss some of these questions in the light of the findings of the palpation of the gall-bladder in 1066 cases of abdominal section where the abdomen was opened low down for symptoms other than those of the gall-bladder. It must be kept distinctly in mind that the discussion is limited to those cases where the principal disease is not in the gall-bladder but in the pelvis, and gall-stones and other disease of the gall-bladder and the biliary passages are present as incidents to the pelvic disease, this decision being arrived at through routine palpation of the gall-bladder region by way of the lower abdominal incision.

First of all I believe it should be stated emphatically once and for all that the day of the small abdominal incision

has long since passed. The small inch or two-inch abdominal incision shows that the operator does not fully realize what modern efficient surgery demands of him. An ovarian cyst removed through an inch and a half abdominal incision means that the operator is entirely ignorant of many intra-abdominal conditions, which if they exist may mean the future discomfort or even death of his patient. Small transverse, suprapubic incisions should also be dispensed with and the abdominal incision, either transverse or preferably longitudinal, should be large enough to admit the operator's hand thus permitting a thorough exploration of the abdominal cavity.

Just as in inspection of the appendix, exploration of the gall-bladder region is contraindicated in the presence of pus or other pelvic conditions whereby infection can be carried upward by the operator's hand. When dealing with inflammatory pelvic lesions, exploration prior to the breaking down of the adhesions limiting the infectious process to the pelvis is a questionable procedure, since if disease of the gall-bladder be discovered an additional abdominal incision is of doubtful propriety in the presence of pelvic infection, even if the incision over the gall-bladder be made independently of the lower abdominal incision.

Again gall-bladder work is contraindicated if the patient's condition at the close of the pelvic operation is such as to preclude additional surgical manipulation. Only poor surgical judgment would lead to the prolongation of the operation beyond certain defined limits. Far better would it be for the patient to run the risk of a subsequent operation upon the gall-bladder, than to prolong the operation to the point where the patient might die from shock.

Coincident gall-bladder operations are also contraindicated where the pelvic operations are performed for malignant disease, unless the operation upon the biliary passages or gall-bladder be urgently demanded for the relief of great

suffering. For instance, it would be inadvisable to remove gall-stones at the same time the uterus is being removed by the abdominal route for cancer of the cervix. Aside from the great shock of radical operations for the removal of the cancerous uterus, the ultimate results of such operations are so doubtful under the best conditions that the gall-bladder should not be interfered with unless the seat of acute symptoms. And the presence of such symptoms makes the gall-bladder or the biliary passages the primary disease and places such cases in a different category from those under consideration in this paper.

Of primary importance is the frequency with which the gall-bladder is affected coincident with pelvic disease and what shall be considered a diseased condition of the gall-bladder. I approach the consideration of what shall constitute disease of the gall-bladder with considerable hesitation, since I am fully aware that from the nature of my work I am not as qualified to answer the question as dogmatically as are those who have to deal with many cases of primary gall-bladder disease. I can only judge the matter from my own limited experience and from what I can glean from a perusal of the experience of others. But the gynecologist must face the situation and deal with it upon its merits or else dodge the question altogether. He must care for the pelvic condition, and either not cure his patient or possibly subject her to subsequent suffering unless relieved by a second abdominal operation.

More and more are we coming to believe that gall-stones, while not producing typical attacks of gall-stone colic, may give rise to many symptoms incorrectly attributed to indigestion. Those symptoms may not be very pronounced, although a source of considerable inconvenience to the patient. Even a careful history will sometimes fail to more than arouse suspicion of the presence of gall-stones. Shall the gynecologist remove the gall-stones at the time of the pelvic operation or, in other words, does the mere presence

of gall-stones warrant their removal when they are discovered during the course of another operative procedure?

I am more and more coming to the conclusion that, other things being equal, gall-stones are a certain menace to the patient and would better be removed as an incident to pelvic operations provided this can be done with slight additional risk to the patient. Certainly, if we follow the precepts of those doing the most gall-bladder work, we would advocate removal. For they tell us that early uncomplicated gall-bladder surgery should be attended by not more than a 1 per cent. mortality, and that the high mortality follows neglected cases. Who can say how or when a gall-stone or a collection of such stones in the gall-bladder will give rise to serious symptoms in a given patient? Certainly this can not be predicted from the number or size of the stones. A small stone may be productive of very serious consequences while a large stone may apparently give rise to no symptoms and be of very little consequence. I recently removed 200 fair-sized gall-stones from a patient at the same operation in which a hysterectomy was performed for an uterine fibromyoma. The closest questioning prior and subsequent to the operation failed to reveal any symptoms referable to the gall-bladder and this is not an uncommon experience.

Certainly it is true that we remove an appendix which appears diseased or is in a condition which may give rise to subsequent disease. Why then should we hesitate to remove gall-stones at the time of the pelvic operation, if they represent an abnormal condition of the gall-bladder and may prove a source of future annoyance and even menace to the patient? In my opinion we should not hesitate to so act, provided we are justified in thinking that the additional surgical procedure can be performed with slight additional risk to the patient and that the gall-bladder operation can be so performed as not appreciably to prolong the convalescence or leave the patient with symptoms not

present before, or worse than those from which she suffered prior to the operation. In only two instances have I regretted removal of gall-stones at pelvic operations. In many more instances have I either regretted not removing the stones when such a procedure was perfectly possible or was forced to regret that the conditions at the time of operation were such as to contraindicate their removal.

In an article read before the American Gynecological Society in 1910, entitled "Gall-stones during Pregnancy and the Puerperium," I referred to 542 women in the University of Michigan Gynecologic Clinic and in my private clinic whose gall-bladders had been palpated during the course of pelvic operations. Of these 542 patients, 64 or 11.8 per cent. had gall-stones. Since that time the number of patients thus inspected has reached 1066, whose gall-bladder findings I desire to submit for your consideration. The two clinics from which these cases have been taken are strictly gynecologic, as far as the University Hospital is concerned and almost the same statement can be made of the private hospital clinic. In the public hospital every patient admitted is examined by the resident physician and assigned to the different services in accordance with the patient's major complaint. Hence in every case where gall-stones were found at the gynecologic operation they were either unsuspected or their symptoms were of minor importance in comparison with the pelvic disease.

Among these 1066 patients gall-stones were found 135 times or in 12.66 per cent. of the cases. It is interesting to note that the percentage of gall-stone cases at the University clinic was 11.97 while at the private clinic the percentage was 14.84. The explanation of this difference in the frequency of gall-stones in the two services lies in the possibility of some gall-stones being overlooked in the public clinic where the operations are performed by the head of the department and his assistants during the third and fourth years of their services. I mention this since I am

certain that stones can be easily overlooked in tense gall-bladders unless great care be exercised at the time of the examinations or if the fingers have not been trained to such examinations.

Kelly found gall-stones in 14.5 per cent. of forty-eight women whose gall-bladders were explored through a low abdominal incision. In each instance where the gall-stones were found the woman had been operated upon for either myoma or ovarian cyst. Kelly estimates gall-stones to be present in about 8 per cent. of all his cases. Of 1244 women operated upon at the Mayo Clinic for uterine myomata 92 or 7.1 per cent. had gallstones.

It has long been recognized that gall-stones are more common in women than in men. Schroeder states that in Germany they are found in 20 per cent. of female and 4.4 per cent. of male necropsies. In 228 necropsies on women, Brockbank found gall-stones in 7.9 per cent., while in autopsies on 542 males, gall-stones were present in only 2.9 per cent. of the cases. In 19,974 autopsies of both sexes reported from Erlangen and Munich there were 1652 cases of gall-stones or 7.8 per cent. Mosher, in 1655 autopsies, in both sexes at the Johns Hopkins Hospital, found gall-stones in 6.94 per cent. of the cases. In 1037 male necropsies they were present in 5.4 per cent. of the cases, while in 619 autopsies on females, gall-stones were present in 9.37 per cent. of the cases.

The high percentage of gall-stones in the present series (12.66) may be due to one or more of three factors: The relative high average age of the patients examined, since it is fairly well established that the older the person the greater the liability to gall-stones; the high percentage of women in the series who have borne children, or finally, to the large proportion of uterine and ovarian neoplasms present in the women examined for gallstones.

In the following table the cases have been arranged according to ages:

TABLE I.—1066 PATIENTS EXAMINED FOR GALL-STONES ARRANGED ACCORDING TO AGE.

Ages.	No. of cases.	No. of cases with gall-stones.	Percentage of cases with gall-stones.
16 to 20	13	1	7.69
21 to 30	276	19	6.88
31 to 40	378	44	11.6
41 to 50	280	42	15.0
51 to 60	79	18	22.78
61 to 70	24	7	29.16
Ages unknown	16	4	
	1066	135	12.66

A study of this table shows that the percentage of gall-stones increases with each decade from the age of twenty years, the single case of gall-stones occurring between the ages of sixteen and twenty years being a great rarity and therefore to be disregarded. The percentages of patients with gall-stones vary from 6.8 per cent. in 276 patients examined between the ages of twenty and thirty years to 29.1 per cent., in 24 women between the ages of sixty-one and seventy years. The percentages at the different ages correspond fairly well with those obtained by Mosher from the autopsies at the Johns Hopkins Hospital, although the percentage of gallstones is relatively lower than those in the present series (9.37 and 12.66).

Harley estimates that 75 per cent. of cholelithiasis occurs in persons over forty years; 20 per cent. between thirty and forty years; 4 per cent. between twenty and thirty years, and 1 per cent. in persons younger than twenty years. This is an estimate and agrees fairly well with Mosher's figures of cholelithiasis in 1655 autopsies on both sexes (see Table II.)

TABLE II.—OCCURRENCE OF GALL-STONES ACCORDING TO AGE.

	Mosher 1655 autopsies both sexes.		Harley estimate.
Age.	No. of cases with gall-stones.	Percentage of cases with gall-stones.	Percentage of cases with gall-stones.
Over 40	91	79.13	75.0
30 to 40	18	15.65	20.0
20 to 30	5	4.34	4.0
Below 20	1	.86	1.0
	115		

Since cholelithiasis is more common in women, it becomes necessary to arrange different series of cases in women according to the age in which gall-stones were found, in order that deductions may be made. This I have done in Table III with Mosher's 618 autopsies in women at different ages and the present series of 1066 cases, all of them in women since the gall-bladder condition was discovered during the course of pelvic operations.

TABLE III.—OCCURRENCE OF GALLSTONES IN WOMEN ACCORDING TO AGE.

	Peterson 1066 cases.		Mosher 618 cases.	
Age.	No. of cases with gall-stones.	Percentage of cases with gall-stones.	No. of cases with gall-stones.	Percentage of cases with gall-stones.
Over 40	67	51.14	44	75.85
30 to 40	44	33.58	11	18.96
20 to 30	19	14.50	2	3.27
Below 20	1	.76	1	.17
Ages unknown	4			
	135		58	

While other factors, such as the number of patients examined at the different ages, must be taken into consideration in arriving at any conclusion, the tables show conclusively that in both males and females gall-stones are much more common after the age of forty years. That age is not the only factor in the production of gall-stones is shown by the relatively few cases in patients over forty years (51 per cent. as compared with Mosher's 75 per cent.), and the relatively high percentage of patients with cholelithiasis between the ages of thirty and forty years (33 per cent. as compared with Mosher's 18 per cent.). It is possible that this other factor besides age favoring the production of biliary calculi at the ages mentioned may be the comparatively large number of uterine and ovarian neoplasms occurring during these ages.

In my former paper, already referred to, I have taken up at some length the reasons why pregnancy and the puer-

perium favor the formation of gall-stones. Among the causes may be mentioned the encroachment of the enlarging pregnant uterus upon the liver and its biliary passages, thereby favoring the stagnation of the bile stream, the resulting infection of that stream and the formation of gall-stones; the same results produced by the limitation of the movements of the diaphragm and the visceroptosis resulting from relaxed abdominal walls following labor. Constipation in women, produced by the lack of exercise and the pregnant state, also tends toward infection of the bile ducts and gall-bladder.

Whatever may be the explanation, it is undoubtedly true that women who have borne children are more subject to gall-stones. In the previous statistics 75 per cent. of the patients with gall-stones had borne children. In the present series the proportion is even greater, since 114 or 84.41 per cent. of the 135 who had gall-stones had borne one or more children. Mayo-Robson claims that 90 per cent. of women with gall-stones have borne children, the same percentage being found by Mayo in a large series of cases of gall-stones in women, and he further adds the interesting statement that 90 per cent. of the patients with gall-stones identify the beginning of their symptoms with some pregnancy.

Are gall-stones more common in women with certain diseases of the pelvis? In order to answer this question I have grouped the neoplasms for which the operations were performed with a view of ascertaining the frequency of gall-stones when removal of the growths was made by the abdominal route.

Gall-stones were present in 10.8 per cent. of 285 cases of fibromyomata, in 14.5 per cent. of 103 sizable ovarian cysts and in 19.6 per cent. of carcinoma of the cervix and body of the uterus. We have already seen that in a large series of cases of myomata at the Mayo Clinic (1244 cases) the percentage of coincident gall-stones was 7.1 per cent. Hence Mosher's findings of 13 cases of gall-stones in 58 women with

fibromyomata, or in 22.4 per cent., are altogether too high to be accepted as the usual percentage and probably were due to other causes, chief among these being the age when such lesions of the uterus and its appendages are most common. For in the present series in 55 cases of gall-stones occurring in patients with these neoplasms, 44 or 80 per cent. were above forty years of age. The high percentage of gall-stones with cancer of the uterus is probably explained in a similar manner, since all of the 11 patients with this disease and with incidental gall-stones were over forty years old. Looking at the question from another standpoint, in 382 patients with either fibroids, ovarian cysts or cancer of the uterus but without gall-stones, only 52.36 per cent. were over forty years. In other words, age, not disease, is the determining factor in the formation of gall-stones.

The observations and operative work upon the gall-bladders were begun years ago when drainage was much more popular than removal of the gall-bladder. Since good operative results were obtained by cholecystostomy, this method was followed in all of the 57 cases when the calculi were removed, except in two cases where it seemed best to do cholecystectomies. To insure adhesions in almost every instance the gall-bladder was sutured to the parietal peritoneum, which possibly explains some of the soreness and dragging sensations in the gall-bladder region which will be spoken of in more detail when end results are considered.

In no case was there leakage or symptoms of peritoneal irritation from the drained gall-bladder. The only two operative deaths in the 57 patients from whom gall-stones were removed incidental to the pelvic operations can not be ascribed to the surgery of the gall-bladder but to peritonitis from unsuspected virulent, purulent foci within the pelvis.

In almost every instance the gall-bladder drainage tube came away in a week or ten days and with few exceptions the gall-bladder wound had practically closed when the

patient left the hospital at the end of three weeks. In other words, the patient's convalescence was little if any prolonged by the additional gall-bladder operation.

The most interesting part of a work of this kind is the most difficult. I refer to the end results of the operations where the gall-stones were removed and the postoperative histories of the patients where the stones were found but not removed. Those who have tried to arrive at end results through correspondence with patients know that the more information asked the less is received. Hence, the form letter was restricted to inquiries regarding the presence or absence of symptoms referable to the gall-bladder. For this was the point of the investigation not the results of the pelvic operations. In many instances it became necessary to call in the aid of the physicians who referred the patients, but in the majority of cases the end results are based upon the answers of the patients themselves.

The 135 patients with gall-stones may be divided into two classes: (*a*) those from whom the gall-stones were removed (57) and (*b*) those where the gall-stones were palpated but for one reason or another were not removed (78). Forty-five or 81.8 per cent. of the first class and 55 or 77.4 per cent. of the second class were traced and their replies analyzed as follows:

(*a*) Patients where gall-stones were removed incidental to pelvic disease.

Among these patients there were two primary deaths and 45 out of the remaining 55 patients were traced. Of these 45 patients, 29 or 64.4 per cent. wrote that they had had no symptoms referable to the gall-bladder since their operations, that is, they had had no gall-stone colic, no jaundice, no pain in the gall-bladder region nor symptoms of indigestion which could be ascribed to biliary calculi.

On the other hand, 16 patients or 35.5 per cent. of the cases, reported symptoms having to do with the gall-bladder region. However, most of those with symptoms, 11 out of

the 16 patients, had had no gall-stone colic nor other symptoms which would lead one to suspect that they had had a recurrence of the gall-stones. Their symptoms were dragging pains in the right side in the neighborhood of the incision or soreness in the same region. As before stated these symptoms are attributable to the method of operation employed, the dragging upward of the gall-bladder and fastening it to the parietal peritoneum. The occurrence of such symptoms in a certain proportion of cases where the gall-bladder is drained by this method has been noted by other observers and has led to drainage in the natural position of the gall-bladder and non-attachment to the parietal peritoneum. In further series of cases this latter method will be employed with the expectation that the symptoms described above will be largely done away with.

Five patients had distinct gall-stone attacks following removal of the calculi and drainage of the gall-bladder. One patient had the gall-bladder removed nine years after the cholecystostomy, no stones being found. Another patient was operated upon ten years after and fifteen stones removed. Still another patient, according to the testimony of her physician, suffered from repeated attacks of gall-stone colic which did not cease until she had passed a number of stones per rectum. Two other patients had what they thought were attacks of gall-stone colic just after returning home from the hospital but had had no recurrence for a number of years at the time of their reports.

Summarizing these findings, it is fair to state that 40 out of the 45 patients, or 88.8 per cent., were free from gall-stone colic following the operations, while 11.1 per cent. had a recurrence of the gall-stone colic. Whether all the stones were not removed at the time of operation or whether calculi reformed after their removal it is difficult to say. Occasionally gall-stones do reform, but from the testimony of those with the most experience it is exceedingly rare.

It is to be regretted that time has not permitted a careful

perusal of the histories in reference to the presence of symptoms prior to the pelvic operations, but such a research is so time consuming that it has been left for a subsequent paper. It can only be stated that while in a few cases gall-stones were suspected prior to the pelvic operations, in no instance were the symptoms such as to overshadow the importance of the pelvic condition. However, it is only fair to say that more careful gall-bladder histories may increase greatly the number of suspected cases.

(*b*) Patients where gall-stones were found but not removed at the time of the pelvic operations.

As expected, the primary mortality was high in this class of cases, for it included many patients with complicated tumors and patients operated upon radically for cancer of the uterus. There were seven primary deaths from causes it is unnecessary to detail, since they have no especial bearing upon the main objects of this paper. They are only of importance as showing the severity of operations and why it was deemed inadvisable to remove the gall-stones at the same operation.

Of the 71 remaining patients, 55 or 77.4 per cent. were traced. Four patients died subsequently, three from causes unconnected with the biliary tract and one six years after the pelvic operation from what was apparently hepatic cancer preceded by attacks of biliary colic.

Of the 51 surviving patients from whom replies were received 32 or 62.7 per cent. had no symptoms referable to the gall-bladder, although one or more gall-stones were present in each instance when they were discharged from the hospital. On the other hand, 19 patients or 37.2 per cent. wrote that they had had symptoms referable to the gall-bladder; 10 had had distinct gall-stone attacks; 6 had suffered from pain in the region of the gall-bladder; 2 had been operated upon for gall-stones, while one had been jaundiced.

Had it been possible to perform cholecystostomy at the

time of these pelvic operations over 90 instead of 62 per cent. of these 51 patients would have been spared symptoms referable to the gall-bladder. But in many of the cases additional operative procedures were clearly contraindicated, and if they had been carried out would have greatly increased the primary mortality. Still in some of the cases the gall-stones could have been removed had we been possessed then of the evidence now at hand, that gall-stones left at the time of pelvic operations will give rise to distinct subsequent gall-bladder symptoms in 30 per cent. of the cases. In another series of cases I would remove gall-stones in every instance unless such a procedure be distinctly contraindicated.

Conclusions

1. Except when contraindicated by the condition of the patient or the possibility of contaminating clean peritoneum, the gall-bladder should always be palpated when the abdomen is opened for pelvic disease.

2. Hence, the small abdominal incision should give way to one large enough to permit of thorough exploration of the abdominal cavity.

3. Gall-stones will be found incidental to pelvic disease in from 10 to 15 per cent. of the cases.

4. Their frequency will depend upon the ages of the patients more than upon the variety of the pelvic disease.

5. As with gall-stones in general, in women with or without pelvic disease the older the patient the more liable is she to have gall-stones.

6. Gall-stones are much more common in women who have children; in the present series of cases 84.4 per cent. of the 135 women with gall-stones incidental to pelvic disease had borne children.

7. When gall-stones are removed at the time of pelvic operations, from 85 to 90 per cent. of the patients will have no subsequent symptoms referable to the gall-bladder provided the proper technique be employed.

8. When gall-stones are not removed either because their mere presence is not thought to warrant their removal or because the condition of the patient forbids further operative procedure, 30 per cent. of the patients will suffer subsequently from gall-stone attacks or other symptoms referable to the gall-bladder.

9. Therefore, since gall-stones are always liable to produce symptoms and at times are a distinct menace to the patient they should be removed when the abdomen is opened for pelvic disease, if this can be done without much additional risk to the patient.

DISCUSSION

Dr. Howard A. Kelly, Baltimore.—I have been delighted with this interesting paper of Dr. Peterson's in touch as it is with the similarly excellent work done by Dr. John Clark, of the University of Pennsylvania, and recalling some of my own work of years ago.

I will call attention briefly to my method of operating in these cases: The lower abdominal incision ought to be, at least, 10 cm. to get the hand in and permit the examination of the upper abdomen. I used to wear a long rubber sleeve for this purpose. If you will introduce the left hand through the lower opening you can lift up the gall-bladder and push the stone up, so that it forms a little hillock on the abdomen, then by cutting through skin and fascia from the outside, the assistant being ready, as soon as the gall-bladder is seen it is caught with two forceps before it is opened and everted through the incision. A single stone is often everted, too. The gall-bladder is then quickly incised and the stone taken out, and the drain inserted and dropped back with no contamination and a minimal opening in the upper abdomen.

I recall a dramatic case of this kind when Dr. Osler was in the operating room, many years ago. He had been poking fun at the surgeons, and as he left the room I called him back for a moment. I had my left arm hid in a towel and my hand in the abdomen, and when he came back I took my knife, made a cut in the upper part of the abdomen, pushed forward the stone and as the gall-bladder appeared, I gave it a nick, and a big black stone popped out onto the floor and bounced over near his feet. He jumped away and exclaimed "What's that?"

Dr. Henry O. Marcy, Boston.—Last year, in going over this ground, I emphasized the importance of removing gall-stones when operating for pelvic conditions, and I heartily approve of the position taken by Dr. Peterson.

Dr. Gordon K. Dickinson, Jersey City, New Jersey.—In quite a series of operations for pathologic conditions in the pelvis performed at Christ Hospital, we have made it a practice to explore the upper abdomen. We may not be able to make a diagnosis of the presence of gall-stones, but there may be a cholecystitis, and if there is we operate, even though we do not find calculi. If we cannot easily and thoroughly compress and empty the gall-bladder, I am suspicious. If there is any calculus or not in the gall-bladder I drain it.

Dr. Charles H. Mayo, Rochester, Minnesota.—The remarks of the last speaker (Dr. Dickinson) have prompted me to say a word or two on this subject. We can generally recognize cholecystitis. Cholecystitis means infection. There is a certain group of glands which drains the lymphatics and the gall-bladder. The same group of glands drains the duodenum, the head of the pancreas and gall-bladder. With the finger in the foramen of Winslow we can learn the normal size of the glands, and when this group of glands is found swollen you may expect there is infection. These glands must be swollen or the condition is not cholecystitis.

Dr. Peterson (closing the discussion).—As I have stated in my paper I do not pose as an expert on the gall-bladder, but I have decided views regarding certain points connected with its surgery. For instance, I am opposed to the small incision advocated by Dr. Kelly. In this region, as elsewhere, the small incision should give way to an incision large enough to allow of careful and accurate surgery.

All cases of primary disease of the gall-bladder have been excluded and the cases comprising the series represent gall-stones so far as their symptoms are concerned quite accidental to the more prominent pelvic disease. My endeavor has been to throw some light upon the question of whether the gynecologist should or should not remove gall-stones found during the course of operations for pelvic disease. I think my researches have shown that symptomatically gall-stones are a menace to the patient and should be removed, if possible, at the time of the pelvic operation.

REPORT OF CASE OF ACQUIRED MEGACOLON

By Irvin Abell, M.D.
Louisville, Ky.

The clinical aspects of megacolon, both congenital and acquired, have been made fairly clear by the report of many such cases in the literature of recent years but the etiology still remains more or less shrouded in obscurity. The history writer to make it of sufficient interest to justify its report. and findings in a case coming under observation seem to the The patient is a white male, thirteen years of age, one of three children of German parentage, with a good family history. He was, to all appearances, a perfectly normal child, well developed physically and mentally; he did not suffer from constipation nor did he present evidence of intestinal disturbance in early life. At the age of seven, he suffered an attack of scarlet fever, complicating which he had a thrombo-arteritis of the left popliteal artery; the circulatory disturbance for a time threatened the integrity of the leg, but the latter was finally fully restored by collateral circulation. The thrombus formation was repeated in the pelvic veins, giving rise to local congestion, edema of hips and obstructed venous return in the right leg. This illness was regarded by his family physician as typhoid fever and treated as such; in any event, his recovery was quite slow and tedious, but at the end of some months the circulatory balance had been apparently restored. Constipation, which was first noted during the attacks of thrombophlebitis,

now became marked and bowel movements were secured with increasing difficulty. At the age of eight, or one year after the onset of thrombo-arteritis, the first abdominal distention was noted. During the ensuing five years, the abdomen gradually increased in size and spontaneous bowel movement ceased entirely, the semisolid feces passing incontinently during sleep in the prone position. At times the evacuation of gas and feces would be interrupted for some days, during which the violent peristaltic efforts of the intestine were plainly visible through the thinned abdominal wall. With the exception of such interruptions there was a constant flow of semifluid feces during sleep, the boy sleeping in the prone position. No fecal evacuations occurred during waking hours except when lying on his abdomen.

He again came under observation in July of the present year, at which time his condition was as follows: Height, 56 inches; mentally dull; skin sallow and muddy; subcutaneous fat scant; musculature poorly developed; arms and legs small; abdomen enormous, measuring 44 inches in circumference at the umbilicus; the abdominal wall was thin, shiny, and showed the presence of large veins, those along the course of the circumflex iliacs being as large as lead pencils; the distended bowel could be felt quite plainly and, during peristalsis, quite clearly outlined; the feel of the bowel was that of solid distention rather than of gaseous inflation; the chest wall was bell-shaped, the contents of the thorax being crowded up toward the apex; heart sounds normal, rate 110 to 116; lungs normal; blood and urine normal; anal sphincter and canal normal; no examination of the upper rectum was made. One-half gallon of barium sulphate emulsion given by enema produced but a faint shadow on *x*-ray examination.

His condition was such that a removal of the dilated bowel was not considered feasible as a primary operation, deeming it best to do a colostomy or ileosigmoidostomy, to be followed

Fig. 1.—Photograph of boy.

Fig. 2.—X-ray showing location of stricture.

later by a resection if circumstances permitted. The abdomen was opened in the median line and a quantity of serous fluid evacuated; the upper rectum, sigmoid, descending and transverse colon were markedly dilated; the sigmoid was apparently between 5 and 6 inches in diameter, occupying the mid-line of the abdomen in a vertical direction, reaching up to the diaphragm, thence curving to the left and descending to the pelvic brim, from which point the dilated convolutions of the ascending and transverse colon filled the remainder of the pouched abdomen; the ascending colon showed a gradual diminution in size until at the caput coli it was apparently between two and three times the normal; the appendix was unusually large and dilated; the ileum adjoining the colon was approximately two inches in diameter and gradually diminished in size, the gut reaching a normal caliber in the jejunum. The size of the rectum was such that its wall was in apposition with that of the ileum at the ileocecal valve.

An anastomosis was made at this point between the rectum and ileum by means of a large Murphy button and the abdomen closed. The operation consumed but a few minutes but at its close the patient's condition was precarious, the pulse rate being over 150. Thinking a dilatation of the anal canal might facilitate the expulsion of feces, this was done and the lower rectum found empty; passing the finger up its full length a stricture was found about two inches above the levator ani muscle. The caliber was small and a curved broad ligament clamp was introduced through it with difficulty, the blades separated and the stricture divulsed. A large quantity of greenish, semisolid feces escaped at the time and continued to do so for the ensuing twenty-four hours. During the following week soap suds enemata produced evacuations, reducing the circumference of the abdomen at the umbilicus from 44 inches to 22. Dilatation of the stricture with a Wales bougie at stated intervals has been the only postoperative treatment employed. Control of the

fecal evacuations was promptly regained and a normal bowel movement occurs daily without the aid of purgatives or enemata. The boy's physical and mental condition has materially improved, so much so that it is questionable if further surgical measures other than divulsion or dilatation are indicated. *x*-ray examination shows the bowel to have decreased in size, the anastomotic opening to have closed and the button lying on the upper face of the stricture.

Viewing the case in the light of its subsequent history, I believe the anastomosis to have been needless, but unfortunately it was made before I was aware of the presence of the stricture. There is no history of syphilis in either parent, nor are syphilitic phenomena present in parents or children. The tuberculin test is negative and physical examination, as far as tuberculosis is concerned, is negative. The origin of the stricture most probably finds its explanation in a fibrosis dependent upon the tissue changes incidental to the thrombophlebitis. Inasmuch as it readily permitted the entrance of the barium sulphate emulsion from below, at the same time almost completely obstructing the passage of feces from above, the inference of a valve action seems clear. The gradual development of the abdominal distention following the onset of marked constipation, with the findings and the subsequent history, would indicate that the fecal stasis and dilatation of the colon were secondary to the obstruction and not of the congenital or idiopathic type.

DISCUSSION

Dr. Randolph Winslow, Baltimore.—I have not operated for the removal of a giant colon, but I had a few years ago a young girl, who was thirteen years of age at the time, who had a very minute opening immediately behind her fourchette or immediately behind the hymen and imperforate anus. Her abdomen was filled up with a mass that my assistant at the time felt and thought was a sarcoma. As you

pressed on it your finger made an indentation, showing there was something soft inside. I made a new anus for her and scooped out a mass of fecal material. The operation was followed by considerable benefit, but doubtless she ought to have had her colon excised. There were, however, reasons why it could not be done. It was a congenital condition, a case of megacolon, showing that in the thirteen years of her life she had never had a normal free evacuation of the bowels—at least, apparently so. At any rate, her stools were inclined to be loose rather than solid. I do not know what became of her.

There was one thing Dr. Abell said I would like to call attention to for a moment, and that was the use of sulphate of barium as an agent for getting *x*-ray pictures of the stomach. There are two salts of barium which may be readily confused with each other—one the sulphate of barium which is innocuous, and the other sulphide of barium which is desperately toxic. It so happened that a few months ago a young man connected with the same hospital with which I am connected ordered for an *x*-ray examination barium sulph. The patient went to a drug store and the druggist instead of giving him sulphate of barium, gave him sulphide of barium. The patient who previously had been in good condition was dead in three hours. If you order sulphate of barium, write barium sulphate, so that there will not be any mistake.

Dr. Kelly.—What was the amount given?

Dr. Winslow.—I do not know what amount was given.

Dr. George W. Crile, Cleveland, Ohio.—The paper of Dr. Abell has been very interesting to me. We have had three such cases in our experience, two by Dr. Lower, and one by myself. In one we did a resection and anastomosed the ileum well over to the sigmoid, so that later on one could make a resection of the megacolon, if necessary. In two of the cases we resected the colon at once, and that give good results.

I rise to speak of what I believe to be the cause of the weak state of these patients with obstruction from any cause including megacolon. In our researches we show that indol and skatol, representatives of autointoxication from the intestines, when injected into animals produce widespread lesions of the abdominal organs and in the brain, and it is practically a picture as to what happens when there is absorption of the broken-down contents of the intestine. These cases of megacolon, among other things, suffer from this type of autointoxication. It is

the indol and skatol that produce lesions in the brain, adrenals and liver just as characteristic as the toxines of the infective products do.

Dr. Abell (closing the discussion).—There is very little to add except to make the point clear that I tried to carry out the procedure suggested by Dr. Crile, but according to the findings and subsequent history nothing further was needed, as the general physical condition of the patient was excellent.

SPINA BIFIDA (TIBIAL TRANSPLANT, FATHER TO CHILD)

By Hugh H. Trout, M.D.
Roanoke, Virginia

This case is reported on account of the ease with which a usually hopeless condition was simply and quickly relieved in one case, and we regret not another spina bifida has reported to the hospital since this operation; although before this time we had seven. These seven cases, both operative and non-operative, present nothing new, but simply the usual text-book cases of spina bifida, meningo-myelocele and one case of spina bifida occulta; two with and five without hydrocephalus. There is nothing unusual in the results of these cases or the character of operations performed, so they will not be considered further.

The last case admitted, however, was a girl baby, aged eight months, which reported to the Jefferson Hospital July 17, 1914, and outside of a rather large spina bifida was practically normal (Fig. 1).

The reflexes, trophic changes, etc., were uncertain and, frankly, we were not able to express an honest opinion on this part of the examination; however, the lower extremities were so weak the baby did not, or could not, move them frequently, and but slightly whenever she did move them. The deformity was situated in the lumbosacral region, and the age and weakness of the child made it almost impossible to ascertain correctly the sphincter control.

The experimental and uncertain side of the operation to be undertaken was explained to the parents, and after some difficulty their consent was obtained. On July 18, 1914,

an incision about 10 cm. long was made over the crest of the father's tibia and a rectangular piece of bone about 4 x 6 cm. and 2 mm. thick was removed by means of a circular saw, leaving the periosteum attached and extending over each side for about 1 cm. In this manner the medullary cavity of the tibia was not entered. The graft was immediately placed in a pan of warm normal saline solution and kept there for further use. The father left the hospital on the third day and had no trouble.

x-ray taken four months after operation shows the difficulty to see from where the bone was removed.

To obtain an autogenous bone graft from any part of the child's body would have required too long a time and thereby increased the danger. Animal bone grafts are certainly not as apt to be successful as homogeneous grafts.

The baby was etherized and a transverse elliptical incision made over the tumor so as to have the incision removed as far as possible from the anus. The sac was readily exposed and the dissection was quickly carried down to the cleft in the spine. This cleft was about 2 x 5 cm., and situated in the lumbosacral region. An opening was made in the fundus of the tumor, allowing about 300 c.c. of clear serum to escape. This exposure showed the various nerve roots radiating over most of the sac, especially in the dorsomedian aspect. It was our intention to trim around these nerve roots as is usually done, but each time we pinched or cut one of them with the scissors the child would stop breathing and become cyanotic. We then decided to close up the sac some distance from the ends of the nerve roots, which we did with a continuous plain catgut suture, and then shoved this collapsed tumor into the cleft somewhat after the manner of Schmidt, held it in this position, placed the bone-graft removed from the father's tibia over it and anchored it by means of chromic catgut No. 0 sutures. These sutures were placed through the periosteum of the graft, the cartilage of the transverse and spinous processes,

Fig. 1.—Before operation.

Fig. 2.—Diagram showing condition before operation.
Fig. 3.—Diagram showing condition after operation.

Fig. 4.—*X*-ray taken before operation.

Fig. 5.—*X*-ray four months after operation.

Fig. 6.—Shows child standing.

and any other firm structure the curved needle would grasp. In order to prevent too much pressure on this collapsed sac the graft was bent like a bow and held in this position on all sides by sutures. The skin was sewed up with fine black silk, and silver foil, cotton and collodian dressing was applied. Figs. 2 and 3 illustrate diagrammatically the procedure and certainly the operation on the baby required less time than it has taken to explain it.

The *x*-ray (Fig. 4) taken before operation shows indistinctly the cleft in the lumbosacral region, while Fig. 8 four months after operation shows the graft between the arrows. It can be easily seen that the growth of the bone in the four months between the taking of these pictures has been rather extensive. The graft can now be readily felt in the baby's back.

In making these lantern slides it was necessary to retouch the graft in order to make it clear on the screen. In the original plates the graft is clear, but when reproduced in the illustrations or slides, it becomes indistinct unless retouched.

Fig. 6 shows the baby standing by herself against her crib, and this in spite of having had a very severe gastroenteric upset lasting over three months and due to the feeding of bacon, etc., by the mother on the advice of a doctor.

In another case we would first aspirate fairly slowly the cerebrospinal fluid for fear the too sudden relief of tension would cause damage to the ventricles of the brain; in addition to this it would not be necessary to sew up the sac, but we would simply use the collapsed sac as a plug in the cleft after closing the hole made by the aspirator, and thus prevent any possibility of leakage.

Of course, where one has a sac already open and an infected field of some weeks' duration without signs of a meningitis, he would naturally hesitate to insert a homogeneous bone graft after inverting the sac, but some experimental and clinical work which we have recently reported as regards

autogenous bone grafts in infected fractures, would, I believe, lead us to try with a reasonable expectation to success, a tibial transplant from some member of the family to the patient. Briefly, we found in rabbits autogenous bone grafts "took" in nearly 80 per cent. of the cases having active infection, while with chronic infections the percentage was even higher.

This was also proved clinically in a few cases of infected fractures which were plated with autogenous grafts and pegs, but not for one moment do we want to be understood as advocating any relaxation in aseptic technique. Such being the case with autogenous grafts, it is not unreasonable to expect a homogeneous graft to "take" in a lower percentage and certainly most anything is better than to allow a continuation of a hopeless condition without even making an effort to correct it or to subject the patient to the usual long and somewhat tedious flap operations attendant with the shock of cutting the nerve roots, etc.

Viewing spina bifida from the embryological standpoint, one finds the condition due to the failure of fusion of the neural arches and it does not strike us as unreasonable to believe the cure is to be found in the supplying of these neural arches, even if we do have to construct them with an older homogeneous bone graft; for such a method is as near as possible to Nature's manner of completing a perfect vertebral column.

A search of over four hundred case reports in the Surgeon-General's Library failed to disclose a report of any similar case which gave us hope that this case would prove interesting; however, at the same time we realize the fallacy of advocating any departure from the routine on one case, but we trust some of you will be sufficiently impressed to try the method and report results, for we are convinced it is safer, quicker and simpler than any other operation we have and worthy of a trial in those cases not associated with hydrocephalus.

DISCUSSION

Dr. George W. Crile, Cleveland, Ohio.—Dr. Trout has emphasized the point that these cases of spina bifida are difficult to handle, and I would like to add one word about the prevention of soiling after operations.

Originally, in our earlier cases, we used to have infection, so we put the child up in lateral splints. One on each side, carrying one leg out that way (indicating), and one leg out this way, and these splints run all the way up to the arm-pit; a general bandage is applied, and we turn the child with face down with the legs spread out and the head a little down; then using a neat diaper, the child can urinate as it likes. The feces drop down in front and we do not have any soiling.

Dr. Winslow.—Did you use the Hamilton double splint?

Dr. Crile.—Yes, with cross-bar below.

Dr. Trout (closing the discussion).—I have never seen a transverse incision made for spina bifida, and that prevents to a great extent the soiling after operation. The nearest part to the anus was at least two inches. The next case I have I will try your stunt.

TRAUMA INTO AND ABOUT JOINTS

By C. E. Caldwell, M.D.
Cincinnati, Ohio

At the risk of being too discursive, I have chosen the above title for my paper, as I wished to discuss certain features of joint injuries which have presented themselves in my own private and hospital practice.

In some instances I have been able to arrive at definite conclusions as to the best methods of procedure; in others I am still left in doubt.

Whether one will or will not resort to operative interference in a given case of injury in the neighborhood of a joint, will always be a matter of individual judgment, based on the results of individual experience in the treatment of that particular type of injury. It will prove difficult to standardize surgical skill, and the ordinary mortal can hardly hope to vie with the brilliant achievements of exceptionally gifted colleagues.

At the shoulder-joint a problem frequently presented for solution is the treatment of fracture-dislocations.

Conclusions will be best reached by a discussion of the altered anatomical conditions, and the manner in which they have been produced.

It may be assumed that when fracture at or near the anatomical neck of the humerus complicates a dislocation, that force in addition to that concerned in the production of the dislocation has been more or less directly exerted at the point of fracture. To me the most plausible explanation is the following:

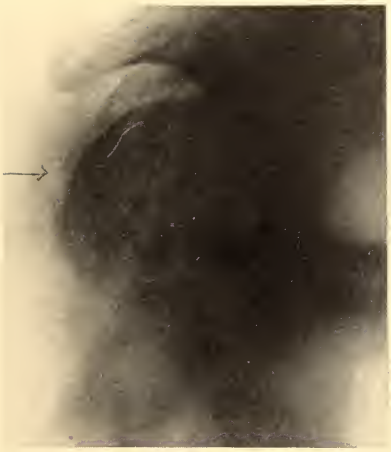

Fig. 1.—Fracture dislocation of the head of the humerus. Note external rotation of the head.

Fig. 2 Fig. 3 Fig. 4

Fig. 2.—Fracture dislocation of head of humerus. Arrow points to subcoracoid position of the head.
Fig. 3.—Fracture dislocation of the head of the humerus. Note subglenoid position of the head.
Fig. 4.—Same as Fig. 3, after removal of head of humerus.

Fig. 5

Fig. 6

Fig. 7

Fig. 5.—Rotation and subacromion position of head of humerus.
Fig. 6.—Same as Fig. 5, after removal of head of humerus.
Fig. 7.—Fracture of surgical neck in patient aged sixty-two years; condition precluded operation.

Fig. 8

Fig. 9

Fig. 10

Fig. 11

Fig. 8.—M. M., aged nine years. Profile view day after injury. Note comminution and obliquity of line of fracture.

Fig. 9.—M. M., aged nine years. Anteroposterior view of elbow, day after injury. Note internal displacement of arm.

Fig. 10.—M. M., aged nine years. Profile view of elbow, two months after plating. Note bony overgrowth from torn periosteum, which is fast disappearing. Result, almost perfect function.

Fig. 11.—M. M., aged nine years. Anteroposterior view of elbow, two months after plating. Note oblique position of plate to avoid bridging the olecranon fossa. Also slight projection over lower end.

Fig. 12

Fig. 13

Fig. 14

Fig. 12.—O. S., aged sixty-two years. Comminuted fracture at elbow treated by reduction of fragments under anesthesia and extreme flexion. Results excellent.

Fig. 13.—O. S., aged sixty-two years. Showing good position of fragments in a comminuted supracondylar fracture, by extreme flexion of the elbow. Functional result excellent.

Fig. 14.—Compound comminuted fracture of humerus and ulna. Fragments removed at operation. Pocket of pus found. Result, stiff elbow.

Fig. 15 Fig. 16

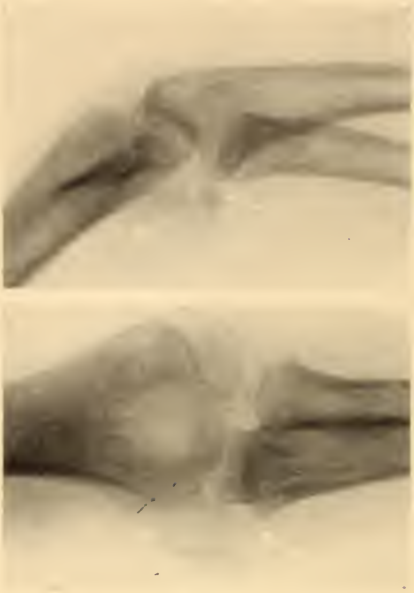

Fig. 15.—Fracture of internal epicondyle, external condyle, and tip of coronoid process of ulna.

Fig. 16.—Dislocation of semilunar bone of carpus. Attempts to reduce before and after operation. Bone removed. Result excellent.

Fig. 17 Fig. 18

Fig. 17.—Compound comminuted fracture of tibia, result of motorcycle accident. Crushed the leg between machine and water trough. Conservative treatment. Patients discharged with good functional result in thirty-two days.

Fig. 18.—Profile view of case of comminuted fracture of tibia, victim of motorcycle accident.

Fig. 19 Fig. 20 Fig. 21

Fig. 19.—Linear fracture of tibia into joint. A fracture easily overlooked. Showing the advisability of skiagraphing when possible since fracture would almost surely be overlooked otherwise.

Fig. 20.—Exaggerated Pott's, including more than the internal malleolus. Good reposition obtained by treating same in the varus position.

Fig. 21.—Fracture dislocation of astragalus. Attempts to reduce under anesthesia failed. Failure to reduce at operation. Astragalus removed. Result good.

The patient falls with outstretched or abducted arm, and when the fall does not result in a Colles' fracture, the force is transmitted through the rigid forearm and arm against the lower margin of the glenoid, against which it is held in closer contact by the contraction of the pectoralis, latissimus dorsi, and deltoid muscles. The force of the impact separates the head at the anatomical neck, and the line of cleavage may or may not include the greater tuberosity as a whole or in part, with its facets of insertion for the supraspinatus, infraspinatus, and teres minor muscles.

Simultaneously with the separation of the head and the resulting tearing of the capsule, the shaft is pulled medianward by the pectoral and latissimus dorsi, and the head of the bone, should the line of cleavage have included the insertion of these muscles, will be pulled upward and rotated outward by the contraction of the supraspinatus, infraspinatus, and teres minor muscles. This outward rotation of the head is shown in Fig. 1, and when it is present it will be impossible, I believe, to reduce the head without operative interference.

Where the head has passed the margin of the glenoid toward a subglenoid or a subcoracoid luxation, or when simultaneously with such passage the tuberosity is avulsed, or what in its effect upon the head amounts to the same thing, the line of cleavage is entirely through the anatomical neck, the head will remain unrotated either in the subglenoid position or subcoracoid, having been pushed into this position by the end of the shaft as it travels inward, following the pull of the pectoral and latissimus dorsi muscles.

In this position, there may be a chance to effect reduction by pressure on the head through the axilla, traction and abduction of the arm being practised by an assistant, with the patient completely narcotized.

The greatest care, however, must be exercised to avoid further damage to already contused vessels and nerves. In the face of the enormous extravasation present in some

cases, such precautions are more readily advised than observed.

In the case of interference proving necessary, I am more and more inclined to advocate operation as soon as the diagnosis has been made and the futility of efforts to reduce demonstrated. I am not disposed to believe that there is one-half the danger of infection through freshly-torn tissues that is present in tissue subjected to the devitalizing effect of pressure and the toxic effect of blood ferments. If wait we must at all, let us wait until the tissues have regained their normal tone, and the possibilities of effective arthroplasty are greater.

Even so early as a week after injury, the difficulty of reducing the head may prove insurmountable, and the removal of the head is the only thing left to do; a most regrettable alternative.

In several instances where I have been forced to remove the head after prolonged efforts to effect a reduction, in two at least I feel that there was much left to be desired in the usefulness of the arm.

How long this disability will last, I am unable to state. It is in part attributable to a lack of a sufficient fulcrum at the upper end of the humerus, the absence of a *point d' appui* for the supraspinatus, infraspinatus, and teres minor muscles, and also in part to conditions which obtain even after simple luxations of the shoulder, *i. e.*, lacerations or paralysis of branches of the brachial plexus, principally the circumflex nerve, which as is well known winds around the surgical neck of the humerus in the most favorable position to be stretched or torn.

The danger of disability from this last-mentioned source should, even in simple dislocations, be anticipated, and the patient prepared for such an event should it occur.

We should always remember that results which are not satisfactory to the patient, do not admit of post facto explanations.

Patients are often fairer and more reasonable than we from our prejudiced standpoint are willing to admit, and a timely setting forth of the possibilities in a given case may prevent much justifiable hard feeling where results do not measure up with expectations.

As to the viability of the head in cases where it is preserved, personally I am inclined to believe that were skiagrams to be taken not six months, but two years after the accident, we should find in many instances atrophy or even complete disappearance of the head. The observations on which such an opinion is based are not sufficiently numerous to be convincing, but time and a sufficient number of observations will demonstrate the correctness or fallacy of the opinion.

The above remarks apply only to fractures through the anatomical neck. The cutting off of the blood and nerve supply in these cases make it particularly desirable that replacement should follow as closely as possible upon the injury, in order that the blood supply may if possible be restored.

A fragment of bone once completely detached from blood and nerve supply is unlikely to preserve its vitality for long.

Especially is this true when, as is the case of the detached head of the humerus at the anatomical neck, there is no periosteum to help it out. I am not ignorant of much of the literature on bone-transplants, but fail to be convinced by much of the evidence of the permanent vitality of these transplants. Because certain epithelial structures continue to grow after death, is no argument for the permanence of their vitality. In one case I removed the head, which proved to be a mere concavo-convex lens of bone which was too fragile to admit of nailing to the shaft.

Where the head can be reduced, sometimes mere suturing of torn periosteum suffices to hold it in place.

In spite of the most rigid asepsis in effecting reduction

it is perhaps asking too much to expect as free mobility in the shoulder as before the injury, and it is difficult to fix the scapula so as to determine accurately the arc of mobility, but if for all practical purposes the range of movement is satisfactory to the patient, we may feel gratified by the result.

Chipping of the edge of the glenoid sometimes further complicates these cases. The best remedy for this is removal of the fragment. Uncomplicated fracture or avulsion of the greater tuberosity of the humerus has not in my experience required operative interference, although I am aware that it is the custom of not a few surgeons to fix them with nails or otherwise.

I have never found it necessary to operate in simple fractures of the surgical or anatomical neck, although I am aware that such operations are not infrequently advisable.

In fractures about the elbow-joint we must sharply distinguish between those occurring in adults and in children. In children hardly any fracture is so severe as not to offer hopes of an ultimate satisfactory result so far as function is concerned. Ankylosis is a remote contingency, and so far as that *bête noire* gun-stock deformity is concerned, it may in most instances be avoided by over-flexion of the forearm on the arm.

In one instance only, I have been obliged to resort to open operation to correct conditions which must inevitably have resulted in a crippled arm.

This case is of sufficient interest to merit more detailed description.

M. M., young girl, aged nine years, in sliding down banisters, fell, landing with great violence on her elbow, on a hard-wood floor.

On examination, within an half hour after the accident, the arm presented an immensely swollen and distorted appearance. Examination under chloroform discovered a badly comminuted supracondular fracture, with great lateral

displacement of the fragments. Flexion of the forearm on the arm resulted in wider displacement of the fragments. The arm was therefore supported in an extended position on a posterior splint and an ice-bag placed in contact with the elbow.

The following day I requested Dr. Sidney Lange to bring a portable *x*-ray machine to the house, and as a result counselled the removal of the patient to a hospital as soon as the condition of the arm would permit of operation. I was actuated in this case by motives of expediency, as I was not satisfied that the soft tissues were in a condition to resist the slightest infection. Should I have another such case, I am sure I should counsel immediate operation. I believe that the difficulties encountered would have been minimized by such a course.

Eight days after the accident, I operated, and found the difficulty in reduction such that I was obliged to make a much larger incision than I could have wished for cosmetic reasons.

The difficulties of adjustment were increased by a rigid adherence to the rule of permitting nothing to come in contact with the wound but instruments and gauze on holders. The nurses were instructed, and obeyed instruction, to pick up the needles and thread them with forceps. A small, three-holed vanadium steel plate was used to fasten the main fragment, and cat-gut sutures to hold the others in place by using the torn periosteum, It was exceedingly difficult to place the plate, as may be seen by Fig. 2, so as to avoid bridging the olecranon fossa. This was finally accomplished by turning the plate obliquely. This obliquity of the plate has caused a slight elevation of the skin at the outer side of the elbow, which if in later years is any source of annoyance to the young lady may be eliminated by removal of the plate.

The wound was closed with Michel clips, the marks of which at the present writing, six months after the operation,

have about disappeared. The patient has almost complete extension and flexion of the arm, and perfect rotation. An obstacle to complete flexion exists in a bony overgrowth from torn periosteum on the anterior surface of the humerus underneath the branchialis anticus. This is noticeably smaller than at first, and I am confident in time will entirely disappear.

In adults, when the elbow shows great comminution, and the fragments are so disposed after attempts at reduction that they will inevitably interfere with function, it is obviously our duty to operate and clear away such wreckage as can not be made to serve a useful purpose in the reconstruction of the joint. While in most instances it will not be possible to secure even an approximately perfect function, we shall at least give the patient the best chance for it.

A myositis ossificans developing in the proximity of the injured joint may exceptionally jeopardize the chances of a complete recovery of function.

Olecranon fractures, when not well approximated in extension, may require wiring or plating, or perhaps nothing further than suturing of the fibrous expansion of the extensor cubiti.

In the wrist I have come across a case of complete dislocation of the semilunar bone which, after repeated attempts to reduce before and after opening the wrist, I was obliged to remove, with perfect functional result.

At the ankle I have been obliged to plate only twice, it being impossible to bring the displaced lower fragment of the tibia into line. Ordinarily I have found the varus position of the feet with adhesive strapping most effective in reducing the displaced lower fragment of the tibia.

I have come across uncomplicated fracture-dislocation of the astragalus only once. The pressure from the inner fragment threatened sloughing of the skin below the internal malleolus. All efforts to reduce under anesthesia had failed. The bone was removed, and patient made a good recovery.

Occasionally as the result of fractures into the knee-joint one or other of the tuberosities of the tibia become markedly displaced, thus altering the weight-bearing surface of the tibia. In one such case, I reduced and nailed the outer tuberosity with an excellent functional result.

Displaced condyles of the femur are exceedingly difficult to manage, whether with or without operation. In heavily-muscled individuals this is especially true. I was unfortunate enough to get a deep infection in a case of compound fracture, in which the first-aid surgeon had neatly sewed up an infected skin wound. Fortunately it was sufficiently anticipated, and the patient made a slow but good recovery after removal of the plate.

Such an experience makes one alive to the occasional dangers which beset the path of the too promiscuous and enthusiastic bone-plater. In many instances treatment by extension and the double-inclined plane will secure a sufficiently accurate coaptation of the fragments to give the patient a good functional result.

I have not recently come across any fractures or avulsions of the tibial spines. In answer to the query of Mr. Jones, of Liverpool, as to whether we in America are not overlooking these cases, I may answer that we could not fail to see them in a good skiagram, and we skiagraph all our knee cases.

It is not impossible that cricket, sprinting, and other out-door sports more universally engaged in, in England and her colonies, may have contributed to Mr. Jones' unusual experience with this injury. Again very few are fortunate enough to have the enormous material that is at Mr. Jones' disposal.

As intimated at the outset, this subject has been treated rather discursively, but my object only was to jot down a few personal observations and to invite general discussion for better enlightenment.

DISCUSSION

Dr. Samuel J. Mixter, Boston.—Dr. Caldwell's paper is interesting as showing the methods of obtaining good functional results with fractures at or near the joints. I simply want to mention a rather extraordinary case I had recently. I have not looked up the literature.

A young woman, thirty odd years of age, during a puerperal convulsion soon after the child was born, fractured both humeri by muscular action. She had a fracture through each anatomical neck. I saw her some months later, when there was a good deal of atrophy about the joints and complete ankylosis of both shoulders. The *x*-rays showed the heads had been separated and turned over, and that there was evidently firm union to the glenoids. I operated, first on one shoulder, and then on the other. It was a trial trip on the first one. In that case I took out the head, which was firmly fastened. The articular surface pointed downward and backward, and I filled in the defect with fat and fascia. I got a fair result in that case, although the time had not been sufficient to give it a thorough trial and there is much atrophy of the deltoid from disuse. Not being satisfied with the first operation, in the second I excised not only the head but the upper part of the humerus, more like a classical resection of the shoulder, and in that case I think I had a decidedly better result. I was strongly tempted in this case to turn the head back in its place, try and fasten it in some way and leave it, as the cartilage was still uninjured, but it would have been difficult, and it seemed to me best not to try the experiment.

I cannot imagine how this woman could have broken the arm the way she is said to have done. There were several people in the room. She brought her arms around behind her, then up in this way (indicating), and then forward and they heard a distinct crack. The arms became black and blue to the tips of the fingers. This is a rather unusual method of breaking the humerus.

Dr. Francis Reder, St. Louis, Missouri.—The splendid success Dr. Caldwell has met with in this extraordinary series of cases speaks well for the plan of treatment he has followed.

Dr. Caldwell has covered a vast subject, but let me go back to the shoulder-joint. It is one of the most important joints

of the body so far as junctional uses are concerned. In fracture of the upper end of the humerus either extra or intracapsular, the happiest condition the surgeon can find is an impaction. There is usually more of a deformity about the joint in an impacted fracture than in one that is not impacted. It is well that the impaction be recognized and appreciated by the surgeon, because it is to be preserved on the ground that no better condition of the bone ends can be brought about by what the surgeon may do. In comparing results with impacted and unimpacted fractures in the upper end of the humerus I can say that the impacted fractures when allowed to remain impacted, have given the better functional results.

In those fractures that involve the anatomical neck and are not impacted, it appears to me that a better plan would be to remove that portion of bone which is broken off. Inasmuch as it is not connected with any ligamentous structure the likelihood that it will perish is great. It must be looked upon as a foreign body and a menace to the articulation.

The head of the humerus is not as fortunate as the head of the femur. The latter has a ligamentum teres and an artery that contributes to the nourishment of the head of the bone.

Dr. James E. Thompson, Galveston, Texas.—There is one point Dr. Caldwell has brought out in his paper that I wish to say one or two words about. The question as to whether we should delay our operations until the engorged lymphatic trunks are emptied is a very important one. Here we are sometimes betwixt the devil and the deep blue sea. If we operate early we run the risk of infecting a wound filled with fresh extravasated blood. If we delay our operation until the lymphatics are free and a large portion of the extravasated blood has been absorbed, the difficulties of bringing the bony fragments in the accurate position are greatly increased. I am not at all certain that it would not be better in the majority of cases to operate early and run the risk of a certain degree of sepsis rather than wait until the operation would be safer. Late operations are often extremely difficult from a technical point of view.

It has been my misfortune in the last few months to have had two cases bearing on this question. Both occurred in sailors, and in both the injury was received at sea. In one case, a subcoracoid dislocation of the shoulder associated with fracture of the humerus near the insertion of the deltoid, ten

days had elapsed between the receipt of the injury and the admission of the patient to hospital. Two days later the open operation was performed. The technical difficulties of the operation were very great. The upper fragment lay almost horizontal. The lower fragment was dragged upward toward the axilla. There was a great deal of extravasation of blood. The head of the humerus was exposed by the anterior incision, and then after division of the insertion of the subscapularis muscle we found it impossible to replace the head into the socket. Traction was employed by means of McBurney's hook. I was forced to divide all the structures attached to the great tuberosity and to dissect out the greater part of the torn capsule before the head of the bone could be replaced into the glenoid cavity. After replacement it was extremely difficult to hold it in its place. The final reduction was very unsatisfactory.

The second case had received an injury to the lower end of tibia and fibula two and a half weeks before admission to the hospital. The fracture approximated that of the Dupuytren type. Both tibia and fibula were broken and the foot, together with the astragalus, was driven upward toward the two bones. A fairly large portion of the lower end of the tibia was still attached to the lower end of fibula. The open operation was attempted and the difficulties were enormous. No satisfactory approximation could be obtained without removal of several portions of the comminuted bone. The final result was also unsatisfactory. I am firmly convinced that if both these cases had been operated on immediately the primary difficulties of operation would have been very few, and that a much more satisfactory result would have been obtained in both instances. Of course, there would have been a greater risk of sepsis.

Dr. J. D. S. Davis, Birmingham, Alabama.—Several years ago I read a paper before the Association of Southern Railway Surgeons and reported thirty-five cases of various elbow-joint injuries successfully treated without operation, and I came to the conclusion that I could successfully treat all cases of injuries of the elbow-joint in that way. I put all these cases up in plaster of Paris, with extension in flexion, beginning the plaster of Paris at the axilla, and with extreme extension in flexion, applying the plaster of Paris well down around the elbow-joint, molding the fragments in position and holding them there. In one case, to show the amount of extension in flexion, one of

my assistants fractured both bones of the forearm in applying extension to get a good adjustment in the fracture at the elbow. I came to the conclusion that I could not fail in any fracture of the elbow after dressing the arm in flexion with plaster of Paris. But recently I had a case of T-fracture of the elbow which I dressed in flexion and failed to get replacement of the internal condyle. I removed the plaster of Paris and reapplied it with forearm extended, and failed to get adjustment of the fragment. I again removed the plaster, opened the arm over the internal condyle and nailed it; then put it up in plaster, and got a very good result.

Dr. W. R. Jackson, Mobile, Alabama.—I would like to say a word or two on this subject. Having had cases of fractures of the anatomical neck of the humerus, I can speak with some emphasis on this occasion.

The first case was a fracture at this point (indicating) with comminution or fragmentation of the head. The *x*-ray picture showed the head was fragmented, and not only outside but in the cavity. The question arose what was the best thing to do for fragmentation of the head in the cavity. I decided I would remove the head. I had the case come to me ten days after the fracture. I transplanted a thin musculo-lipo-fascial flap from the bursa of the deltoid between the ends of the bone, fixed it in plaster of Paris, and the man got a splendid result.

The next case was a fracture with displacement of the head upward, and I decided to put the head back. I did it with two nails. I put the head back this way (indicating): I drilled a hole through here and put one nail through there and another nail through here (indicating). These nails crossed. I am sorry I did it, because I got complete ankylosis of the worst kind. The man had some use of his shoulder-joint from the scapular girdle.

With reference to fractures of the T-type of the elbow-joint, sometimes the supracondyloid ridge or external and internal condyles are knocked off, and there may be a subcutaneous injury. With a detachable drill it is hard to replace these under anesthesia three or four days after occurrence without an open operation. With some detachable drills, used after the manner of Murphy, you can coapt the bones, screw them in and get them perfectly coaptated, and then put them up in right-angle flexion.

Sometimes we have fragmentation of the humerus near the

elbow-joint, with so much comminution that it is a difficult thing to get coaptation. I have had two such cases and have bound the fragments together with phosphor-bronze wire and buried them, put in a screw and nail, getting splendid results in that way.

Dr. Randolph Winslow, Baltimore.—I have been much interested in this subject. Being connected with a large hospital I naturally see a great many cases of fractures.

It is difficult to know what to do with the head of the humerus under these circumstances. I am inclined to believe that the best thing to do to the head of the humerus is to fasten it to the shaft. Dr. Jackson says that he got ankylosis in his case, but I do not see why he should have gotten ankylosis by doing that. When you remove the head of the bone, or when you excise a portion of the upper end of the shaft, you cannot get good abduction for the simple reason that the lever is shortened and you do not have the normal amount of leverage.

I want to call attention to the matter of treatment either with or without operation of fractures about the shoulder-joint, and that is, most of these injuries at the upper end of the humerus are best treated either after you have operated or before, which is preferable in many cases, with the arm in an abducted position, in what is called the Albee position, extended and abducted and held there by mechanical means, that is, by plaster of Paris. I think in that way you get better apposition than you get in other ways.

Dr. Goodrich B. Rhodes, Cincinnati, Ohio.—There is one type of fracture or of epiphyseal separation which is commonly known as Schlatter's disease. I have seen two such cases. You remember the epiphyseal beak of the tibia is developed from a separate embryonal centre of ossification, and the patellar tendon is inserted into the beak. Sometimes a person in falling will make a sudden contraction of the rectus muscle in the effort to catch himself, in the same manner in which a fracture of the patella is produced. Instead of fracturing the patella the force succeeds in pulling this beak upward, separating the beak from the tibia proper, thus stripping the tuberosity of the tibia from the diaphysis of the bone, causing not a true fracture but an epiphyseal separation. This condition will not remedy itself because the constant use of the patellar tendon in the ordinary activities of every day life will endeavor to strip up the beak. These patients have a charac-

teristic shambling gait with knees semi-flexed. The proper remedy for this condition, I believe, is fixing the tuberosity of the tibia to the shaft of the bone with a nail.

Dr. George W. Crile, Cleveland, Ohio.—I was present at a meeting of the British Medical Association when Mr. Lane summed up his work on bone fractures. As I recall, he made the statement that if one plates, in a child, the epiphysis and diaphysis, there will invariably and inevitably be shortening of that bone, because the plate will hold and prevent extension of the growing bone, and he advised that the plate in such a case in a child should be removed.

Dr. H. H. Trout, Norfolk, Virginia.—I was very glad to hear Dr. Crile make the statement he did with regard to the work of Mr. Lane. We have recently done some experimental work in rabbits, also in children, in which we put a foreign body in the epiphyseal line and got shortening in two children. We have had three separations of the epiphysis, and by making use of autogenous transplants there has been no shortening, and the same thing has been carried out in rabbits.

Dr. Caldwell (closing the discussion).—I have very little to say. I am very much gratified that my paper has brought out this interesting discussion.

In regard to the question of nailing heads, there is one case in particular in which I got the head back and it recovered nicely. The man had very much more motion than I had reason to suppose he would have, and just before I came to this meeting I had an x-ray plate taken of his shoulder which shows an interesting result. To my astonishment that head has simply separated and dislocated again, and almost completely atrophied. There was more or less evidence of myositis ossificans in the neighborhood, yet the man was having apparently a perfect functional result. He is a motor cyclist and drives his machine, and does all sorts of things with full use of his arm.

With regard to what Dr. Crile has said, I knew objection would be made to the plate. It is now six months since the child was treated and there is not the slightest evidence of shortening. I recognize the possibility of shortening, but if there should be anything of that kind, it would be easy under local anesthesia to make a little slit and remove the first screw. I am looking out for that. I anticipated that objection, and I shall act accordingly if there is any evidence of shortening.

THE BULGARIA BACILLI IN CYSTITIS AND PYELITIS WITH ALKALINE URINE

By Francis R. Hagner, M.D.
Washington, D. C.

At the meeting of the American Association of Genito-Urinary Surgeons in May of this year, Dr. John R. Caulk, of St. Louis, read a paper entitled "Incrusted Cystitis and the Use of the Bulgaria Bacillus in its Cure."

In this very severe form of alkaline cystitis, we were considered, to quote Unterburg, Lichtenstien, and others, to have been therapeutically helpless. The idea of Dr. Caulk in using the Bulgaria bacillus to combat the alkaline urine is a very important addition to the successful treatment of these distressing cases.

Eight or ten years ago, Young made efforts to cure alkaline cystitis by the implantation of the colon bacillus, in the hope of getting an acid reaction in the urine by its growth. At the time Young was trying this, I had an experience with a patient in which the urine was markedly alkaline and cystoscopic examination showed a very contracted bladder ulcerated over its entire surface with a deposition of phosphatic deposits over the ulcers. The Proteus Bulgaris was isolated from this case; repeated attempts to inoculate the bladder with the colon bacillus failed, although traumatism of the bladder wall was made at the time of inoculation in the hope of getting a growths that might cause an acid urine and destroy the proteus infection. The proteus being a very resistant organism,

seemed to kill the colon, causing its disappearance almost immediately.

North, in 1909, collected a large series of cases in which the Bulgaria bacillus had been used. In a series of 300 cases, he made mention of but two in which it was used in the bladder, and these were indefinite reports; so I feel sure that Dr. Caulk is a pioneer in this work. It is a known fact that certain species of bacteria are positively antagonistic to others, as regards growth and development; an example of this is the well-known disappearance of the normal flora of the urethra in the male, during the course of an acute gonorrheal urethritis.

The most common organism found in alkaline cystitis is the proteus. There are cases reported, however, in which the staphylococcus, streptococcus, colon and tubercle bacilli were found. There is no question the Proteus Bulgaris is the organism found to be most frequently the cause of cystitis when the urine is strongly alkaline. Lavage, instillations, etc., have very little effect, especially in those cases having a tendency to incrustation. In these patients there are bacteria growing which require an alkaline or faintly acid media. The injection of any acid, mineral or organic, will afford only a temporary change in reaction, because of the frequent evacuation of the bladder. Introducing an acid-producing bacteria, some unquestionably remain during urinations, become implanted, multiply and create enough acid to transform the urinary reaction. In the bacterial battle which follows, the Bulgaria bacillus soon demonstrates its superiority and so overwhelms the proteus that the changes in the patient are often seen immediately.

It might be said, to quote Dr. Caulk, that the technique of injecting an emulsion of this bacillus into the bladder might be faulty for two reasons. (1) The introduction of other bacteria; (2) these bacilli might be harmful. To defend the treatment against these remarks, it may be

said that several cultures of these tablets of Hynson & Wescott were made by Dr. Thomas of Washington University and on each occasion a pure culture of lactic acid bacilli was obtained. The Bulgaria bacillus seems to lack resistance to chemicals, and even to their own acid products, because where a certain degree of acidity is reached they die. One bladder irrigation of 1 to 20,000 bichloride will completely destroy these organisms.

Experimental work on dogs shows that injections of the organisms into the bladder followed by traumatism produces no evidence of inflammatory change in the mucosa, and the urine four days after injection was sterile, so I feel sure we can use this organism with safety in the bladder.

Dr. Caulk reports a very instructive case of alkaline cystitis with ulceration, deposition of lime salts, and the formation of papillary areas, also incrusted with calcareous material. This patient had been operated upon a number of times, the ulcers curetted, all forms of irrigations and instillations having been used, with practically no benefit to the patient whatever.

At the time Dr. Caulk began to use the Bulgaria bacillus she was in a frightful condition, tenesmus, urinary frequency, blood and offensive urine. Following the first injection, the patient spent a much more comfortable night and was finally cured by the instillation of the emulsion of the Bulgaria bacillus.

The following is the method we have employed in our own cases: The bladder is first irrigated with sterile water; this is very important, as any antiseptic will probably prevent the growth of the Bulgaria bacillus. Three or four tablets are then dissolved in 1 oz. of sterile water, this is well stirred, as these tablets are only in suspension. The solution is then injected into the bladder with a syringe, and the patient is told to retain it as long as possible. The effect is often noticed at once, as the urgency and pain are diminished.

I will briefly cite a few cases showing the prompt action of this organism:

First case, patient seventy-six years of age, on whom a suprapubic prostatectomy had been performed. This operation was just before I left to hear Dr. Caulk's paper. When I returned six days later, the patient was in a very precarious condition, inactive, somnolent, pulse weak, appetite poor, and showed every evidence of sepsis, although he had had frequent bladder irrigation, urinary antiseptics, etc., the putrid odor from his urine permeated his room. The edges of the suprapubic wound were necrosed, gangrenous, and covered with calcareous deposits.

The patient's condition was alarming and it seemed as if he would have an unfortunate ending. Urine collected from the suprapubic wound was strongly alkaline, contained myriads of large bacteria that proved to be the Proteus. The patient's bladder was irrigated with sterile water through the suprapubic wound, and four tablets dissolved in 1 oz. of sterile water were introduced into the bladder and allowed to remain. This was done every four hours, and on examining the patient next day his general condition was much better. The offensive odor had entirely disappeared, the only odor noticeable being a slight sourness due to the Bulgaria bacillus, and the urine was strongly acid. The tablets were then introduced three times daily. Seventy-two hours after the first introduction of the Bulgaria bacillus the slough had entirely disappeared from the edges of the suprapubic wound; the deposition of lime salts had ceased, the urine was clear, and the patient's general condition was most satisfactory. The tablets were kept up three days longer, and when they were discontinued the patient made uninterrupted recovery, the urine continuing acid. We have used it on several patients having hypertrophied prostate where there was but little residual urine, suffering from recurrent attacks of frequency and tenesmus with alkaline urine, and the result have been quite as striking.

We have recently had a patient who gave a history of chills, fever, recurrent attacks of urinary frequency and tenesmus extending over a period of three weeks, with cloudy alkaline urine. Cystoscopic examination showed a bright velvety area just behind the right ureteral orifice, *x*-ray negative for calculus, the possibility of tuberculosis of the right kidney was considered; several urinary examinations failed to show the bacilli.

Guinea-pigs inoculated continued to gain weight. This patient's right kidney urine was strongly alkaline and contained much pus and some blood, while the urine from the left was but faintly alkaline, containing but a small amount of pus. Cultures gave a staphylococcus aureus. Instillations into the bladder improved the patient's condition, but the urine from the right kidney continued alkaline and the pus continued to be present in the urine. I then thought I would try injecting the kidney with the Bulgaria bacillus. Two tablets were dissolved in 10 c.c. of sterile water and injected in the kidney pelvis through the ureteral catheter. He had no trouble for thirty-six hours, when he had quite a sharp chill, temperature going to 103.5° F., but becoming normal in twelve hours. The day following the injection the patient's urine was acid and although I made two more Bulgaria injections into the bladder, no more treatment was directed to the kidney. The patient has now been away from the hospital two weeks, his urine remaining clear, acid, and free from pus.

Although a good deal of fun has been poked at the Bulgaria bacillus, I believe it is a very valuable addition to the therapeusis of cases of bladder infection with alkaline urine.

DISCUSSION

Dr. Bransford Lewis, St. Louis, Missouri.—I do not know anything about this treatment from personal experience because I have not had an opportunity of using it. If it should

prove a valuable addition to the genito-urinary pharmacopea—and I have no reason to doubt its value—I am sure we will all welcome it, as it will be a tremendous advantage in the class of cases under discussion, because in the past these alkaline infections of the bladder, notwithstanding our most ardent efforts, have kept up. I have not had any such cases recently, but I shall take advantage of the treatment discussed by Dr. Hagner.

Dr. Gordon K. Dickinson, Jersey City, New Jersey.—I take it this bacillus acts by substitution. It may seem something of a joke to go back to old times, but for some years I have been using yeast plant in the same way. It is phagocytic. It has its enzymes and works effectively in substituting itself for the less active and less vigorous bacillus. I have not injected it into the *pelvis* of the kidney, but have used it in various conditions, either in suspension or as a paste, and my interns prefer it to any other treatment which is used in the hospital.

Dr. Guy Leroy Hunner, Baltimore.—I would like to add just a word to this discussion because of having had a case of proteus pyelitis in which various methods were tried to get rid of the kidney infection, that is, using silver nitrate, one to five hundred, formalin solution, and weak carbolic solution, all without effect. I was tempted to try the substitution of colon bacillus infection for the proteus infection in the kidney, but unfortunately the patient was called home on account of illness of a member of the family. She was an intelligent woman and the treatment was explained to her, although I told her I could not promise anything as to results. It was to be merely an experiment. She understood it as such. It seems to me this substitution of the Bulgaria bacillus which Dr. Hagner has outlined will offer very good prospects of a cure in that very case. I do not know of anything more resistant to our efforts of eliminating the infection than the Proteus bacillus in the kidney or bladder.

Dr. Hagner (closing the discussion).—I would like to say one word. In this case in which I injected the pelvis of the kidney, I previously washed the kidney with argyrol and nitrate of silver with no result. There was prompt recovery after the Bulgaria bacillus injection. The urine was alkaline before injection and I neglected to say a pure culture of staphylococcus aureus was obtained from the ureteral catheter inserted in the kidney pelvis.

SOME RESULTS OF ORTHOPEDIC SURGERY

ILLUSTRATED BY LANTERN SLIDES AND MOVING PICTURES

By Fred. G. Hodgson, M.D.
Atlanta, Georgia

The following moving pictures are shown to illustrate some results obtained in modern orthopedic surgery. These cases are patients of Dr. Michael Hoke, of Atlanta, and I am indebted to him for the privilege of showing them.

Case I.—L. H., boy aged three years. Congenital club foot. His tendo achilles had been cut, and plaster used by the family physician with no improvement. He was operated upon, a wedge-shaped piece of bone was removed from the neck of the astragalus, an osteotomy of the metatarsals, and the foot held in plaster in the corrected position until healed. This was followed by massage and training in the proper use of the foot. The moving picture shows him walking and running on a perfectly strong and useful foot.

Case II.—Mrs. P., aged sixty years. Had double paralytic club foot. Came in because the braces which she had worn several years hurt her feet. A wedge-shaped piece of bone was removed from the very much hypertrophied astragalus and the antero-external corner of the oscalcis on each foot. Foot held in plaster until healed. Massage and muscle training after casts were removed. The picture shows the patient walking with straight feet and using no braces. She is a most grateful and happy patient to be rid of her practically life-long deformity and encumbrance of braces.

These two cases illustrate a very young and a very old case, both having bone cutting operations to properly restore the normal balance of the feet. After the bones have been used in an abnormal position, they are deformed and must be remodelled before the feet can be straightened and kept straight. In early infancy, of course the feet can be manipulated and overcorrected, and held by plaster of Paris. Some cases require only tenotomy and manipulation; but older cases practically all require some bone cutting operation to obtain and maintain the proper use of the feet.

Case III.—P. L. Arthroplasty knee. Colored girl, aged seventeen years. Gono-arthritis. Ankylosis in slight flexion for two years. *x*-ray showed bony ankylosis between femur and tibia; fibrous ankylosis of patella to femur. Murphy arthroplasty using fat and fascia flaps placed between the bones. Bed traction. Passive motion began in third week. Knee manipulated under gas in sixth week to increase motion. Now has good flexion and extension and bears weight steadily and without pain.

Case IV.—Mrs. P. Arthroplasty of knee. Woman, aged thirty years. Had infection of knee following puerperal infection. *x*-ray shows bony ankylosis of patella to femur and fibrous ankylosis of femur and tibia. Knee is held in permanent flexion at 25 degrees, and there is only slight motion in flexion possible.

Murphy arthroplasty with fat and fascia flaps. Weight extension applied after operation. Passive motion begun after two weeks. Motion has steadily increased with skilled exercises and massage, and she now has complete extension and flexion to a right angle. Can support entire weight upon operated knee. Walks without any limp. Can walk two miles without discomfort.

Case V.—Allan C. Aged twenty years. Six feet, seven inches tall, weight 265 pounds. "Hammer Toe" of all toes except great toes. Condition came on gradually. Was never able to get shoes large enough for his feet. Right

foot operated upon first. Second, third and fourth metatarsals had one-fourth inch section cut out of each. Arthroplasty between first and second phalanx of each toe, dorsal flexor tendons of fifth toe lengthened.

The toes are now straight and freely movable. The callosities on sole and on top of each toe have disappeared. Has perfect use of toes and feet are comfortable. Left foot operated upon in same manner six weeks later. Result the same.

Case VI.—James R. Aged thirteen years. Old infantile paralysis. Pictures show patient as he came to us on crutches, his foot badly turned and almost useless. The next picture shows him walking without crutches on a perfectly useful foot.

Case VII.—Jack T. Aged four years. Old infantile paralysis. Came to us with foot badly turned outward and ankle rotated inward, walking with severe limp. Picture shows him after operation of tendon transplantation and remodelling the bones of foot, walking with foot straight and much less limp.

Case VIII.—Jim P. Farmer boy. Aged sixteen years. Old infantile paralysis. Foot in club foot position (t. e. v.), could not get heel to ground. Pictures show condition before operation.

Tendo achilles was lengthened, a wedge taken out of head and neck of astragalus. Foot put up in over correction. Pictures show result after operation. He is very proud of his straight foot and does not worry about the slight limp which necessarily remains due to muscle paralysis.

Case IX.—Jos. P. Aged five years. Albee operation. Has had Potts' disease since he was two years old. Has been treated by long periods of recumbency on frame, plaster jackets and braces. A piece of bone from tibia was grafted into the spines of the vertebræ. Has kept quiet on plaster bed for three months; then allowed to get up with light back brace.

The picture shows him running around without any support and gives a good idea of the free use he has of his spine.

Case X.—Amos T. Aged six years. Old infantile paralysis. When this little boy from the cotton mill district of South Carolina came to us, his only means of getting around was by crawling on all fours. The first picture shows his futile attempts to walk when assisted by an adult.

After a few tenotomies, transplantation of tendons and scientific training in the use of his muscles, the second picture shows him running around on crutches. There is much to be done on this little fellow still. But when one sees the happiness he gets out of being able to use his feet at all, one feels that even this poor mode of progression is well worth while.

You will note that none of these children are wearing braces. Our endeavor is to get rid of all braces, and to so balance the skeleton and transplant the tendons that the patient can get along with as little artificial support as possible, and so develop his muscles to the greatest possible extent.

DISCUSSION

Dr. C. E. Caldwell, Cincinnati, Ohio.—I have been exceedingly interested in this paper, for the reason that for a period of ten or twelve years I was doing orthopedic work at the City Hospital, Cincinnati, and I have nothing but commendation and praise for the excellent results shown in this paper.

If I may be allowed to criticize the expediency of certain operative measures where the results are apparently so good, as in these cases, I would first like to ask the question as to how long in the cases of arthroplasty the moving pictures were taken after operation, and again to raise the question as to whether in such a case the result is preferable to a knee after a formal excision?

I have done a comparatively large number of excisions of the knee-joint where the patients are doing all sorts of arduous work, such as hod carriers going up and down ladders, men working in factories, men who are carpenters actually get down

on the floor and do carpenter work after excision with absolutely secure and strong knees.

I have been watching this arthroplastic work for a long time and have done some of it myself, and I must confess a little skepticism as to the stability of these joints under those circumstances. Many of these patients walk remarkably well. I have a patient who you would hardly recognize as stiff in the knee if you met him on the street, barring a little rocking of his pelvis. He is able to go up and down stairs with this knee very well. Take the patient whose case has been reported. In going up and down stairs there is danger of falling because the instability is too great. I am not persuaded that the end-results of arthroplasty of the knee-joint can be depended on in spite of what we hear, and I have to be shown the end-results before my skepticism is overcome. Otherwise, I think the work is most interesting and commendable, but I must raise the question as to the practical utility of this work, and that is what we are practising medicine for, to help our patients and not to show our surgical skill.

Dr. Hodgson (closing the discussion).—In regard to the point raised by Dr. Caldwell I think it is very well taken. Both of these cases were in women, and a woman dislikes very much to have any deformity, and these are not women who have arduous work to do. I agree with the doctor, because if it had been my own knee or the knee of a working man I should think the operation of doubtful expediency. But these women in order to get rid of deformity are willing to take a slight risk. We explain that risk to patients, and if they are willing to take it, we let them take it. In a hard working man who has to get down on his knees and climb ladders, we would not undertake arthroplasty.

In the little boy I showed you we had a case of badly neglected infantile paralysis. I do not remember the exact length of time he was on crutches, but he had two sets of operations. First, we did tenotomies below his anterior superior spine to get his legs out straight. His feet were turned backward and his Achilles were contracted. We straightened these out first. It took a period of six months from the time of the first operation to the end-result.

In orthopedic work we expect to be slow in achieving results. We take our time. Sometimes we find we get unexpected results in the development of muscles which were entirely out of commission at the time we started the balancing work.

TREATMENT OF ANGIOMATA BY INJECTION OF BOILING WATER (WYETH METHOD)

By Francis Reder, M.D.
St. Louis, Mo.

It may prove of interest to preface my remarks on the treatment of angiomata with a short resumé, setting forth some of the characteristics of these vascular tumors. In speaking of a blood angioma we designate a tumor composed of dilated and abnormally arranged bloodvessels in thin trabeculæ of connective tissue. These tumors present such clearly defined pathological features, that they may be conveniently divided into the superficial or simple, and the deep or cavernous.

The simple angiomata, the so-called port-wine stains and mother's marks, usually occupy the superficial layers of the cutis. They may, however, be harbored in the subcutaneous or submucous tissue, and assume the form of fairly large swellings.

In their construction, they consist of tortuous and dilated capillary vessels, imbedded in a small quantity of connective and adipose tissue. It is not unusual to find the involved area of skin slightly elevated. If these newly formed vessels are very abundant, if there is a marked thinning of the epidermis and a flattening of the papillary bodies, the condition will be designated as a cavernous nevus.

The discoloration of the simple angioma, which imparts to it one of its chief characteristics, depends upon the depth of the affected vessels. If they are superficial, the markings appear usually red, and when subcutaneous, a purplish or bluish color is imparted. The color of a simple angioma can

be made to disappear by pressure, temporarily restoring to the skin almost its normal whiteness. As soon as the pressure is relieved, the discoloration returns.

These angiomata possess no clinical significance. Exclusive of the unsightly appearance of some, they cause no discomfort, and it is not often that the possessor of a port-wine stain seeks advice as to the possibility of having it removed. Even so, should the angioma involve a large area, which they not infrequently do, nothing of an encouraging nature as to its total or even partial removal could be promised.

An interesting fact in connection with capillary angioma is that their distribution quite often corresponds to the area of distribution of the three branches of fifth cranial nerve, viz., angiomata of the frontal germinal area, angiomata of the superior maxillary area, and angiomata of the inferior maxillary. Barensprung was the first to call attention to this. Cushing and others later confirmed his observations. Simon entertained a similar theory. He became impressed with the idea that nutritive disturbances in the region of the trigeminus was causal in producing such a condition. Lamy also in his interesting exposition of this lesion adheres to a theory that angiomas are congenital vascular productions, caused by modifications occurring during embryonal development. Virchow advanced a theory that angiomata find their origin in the embryonic relations when slight irritative conditions about the margins and the circumference of the fetal (branchial) clefts, which are always copiously supplied with bloodvessels, may cause an abnormal development about these parts, with the possibility of a nevus formation. Such a condition may remain latent for a time, and later manifest itself as a cavernous angioma. He has applied to them the name of angioma-fissuraux.

According to Ribbert, the genesis of angiomas rests with two questions: Is the tumor a simple dilatation of the ves-

sels in a circumscribed area; or is the tumor the result of a new growth? To this may be added Stangl's argument as to whether or not these tumors are of epithelial or connective-tissue extraction.

Ribbert advocates the view that these vascular tumors are the result of a new growth.

It must be inferred, however, from the exhaustive researches this interesting lesion has been subjected to, that the genesis of angiomas is not clearly understood. There even is some doubt as to whether or not these vascular neoplasms are free from suspicion, *i. e.*, if they may not at some time take on malignancy.

It is true that their histological formation closely resembles certain types of malignancy, yet clinically angiomata are considered non-malignant. That angiomata are congenital in their origin is no longer a disputed fact. Cavernous angiomata, the type of vascular neoplasms in which the interest of this paper is centered, present a pathology that microscopically does not differ from the simple angioma. It is only macroscopically that its characteristics overshadow the latter.

A practical definition for a cavernous angioma would be that it is a soft, non-pulsating swelling, of variable size, with a thin covering of skin, usually bluish in color. Its great differential factor is that the entire tumor can be caused to disappear upon pressure, with a prompt return to its original size as soon as the pressure is removed.

These vascular neoplasms present individual characteristics. Particularly is this true when some of the vessels entering into the formation of the tumor empty arterial blood in sufficient quantity into the spaces to cause a distinct pulsation. Furthermore, the connective tissue enmeshing the vessels is sometimes scanty and sometimes plentiful, thus causing irregularities in the circulatory apparatus of the angioma with a resultant lobulated appearance of the tumor.

An additional individual characteristic of import is that

a cavernous angioma is responsive to the temperament of the possessor, excitable influences causing the tumor to to swell, become tense and more deeply discolored.

The construction of a venous angioma consists of irregular fibrous alveoli which communicate freely with one another. The theory that these neoplasms are caused by a dilatation of the capillaries, the walls of which eventually become absorbed, resulting in the formation of spaces, has been favorably received.

The walls of these spaces possess an endothelial lining similar to that of veins. These cavities are distended with blood supplied by numerous tortuous vessels, which circulates with varying degrees of rapidity. The arteries open directly into the cavities.

Venous angiomata may be diffuse or form distinctly circumscribed tumors. The circumscribed cavernous angioma possesses its distinct efferent artery and afferent veins, and does not communicate with the neighboring capillaries, *i. e.*, there exists no anastomosis with the capilaries in the surrounding tissue. The angioma shows a circulation wholly within itself, with only a connection with the arteries and veins of the neighborhood.

Their growth is slow. They increase, however, progressively in size with the growth of the patient. For instance, a babe which at three months shows an angioma upon its lip that has the appearance of a flea-bite, will exhibit the same lesion the size of a hazel-nut nine months later.

From statistics it must be inferred that the face is the favored locality for these neoplasms, two-thirds of these growths being located there. The brow and the cheek seem to be favored regions. Next in frequency come the lips, the nose, the ears, and the eyelids. Strange as it may appear, the feminine sex is more prone to this affliction than the male, two-thirds of all cases occurring in females. Cavernous angiomata may occur also in the orbit, muscle, liver, spleen and kidneys and stomach (Sherrill).

Inasmuch as there is no pain in connection with such a vascular tumor, excepting when the swelling causes pressure upon a nerve, the discomfort experienced must be ascribed to its size and location. For instance, a vascular tumor situated upon the upper eyelid can become very annoying on account of visual interference. Again, an angioma of the cheek may involve the buccal tissue to such an extent as to make mastication difficult and even dangerous. This was exemplified in one of my cases where the patient accidentally bit the inner side of her cheek, causing an alarming hemorrhage.

Is a cavernous angioma a lesion that endangers life? The reply to such a question must be guarded. These vascular tumors possess an element of danger in proportion to their size and location. When there is non-interference their growth may eventually produce a secondary lesion by spreading indefinitely, which may cause death. The greatest danger rests with an operative intervention for their cure, and the danger is hemorrhage. Many of these vascular tumors are inoperable, as has been demonstrated repeatedly by an attempted operative measure which had to be abandoned.

That the prognosis is discouraging in the extreme is evidenced by patients who for years have endured the deformity and the discomfort, simply because nothing could be done for them, except the suggestion of a hazardous surgical operation.

When Dr. Wyeth advocated the injection of boiling water into these tumors as a curative agent, I doubt very much if he was aware of the greatness of his beneficent advice. In a series of some twenty-six cases which have been subjected to this treatment, I have no failures to record.

In every instance the results have been very gratifying. I may state that most of these cases presented the lesion upon the face and scalp. Four patients presented angiomata upon the tongue, ranging from the size of a filbert to that of an English walnut. One patient presented the lesion upon

the left gluteal region, as large as a cocoanut, and another patient, a young man of eighteen years, presented a fusiform angiomatous growth upon the right middle finger, between the second phalangeal articulation and the knuckle. This tumor caused great pain.

The surgeon who is confronted with a cavernous angioma must appreciate the gravity of this affliction. He will realize in a comparatively short time that these neoplasms are among the most difficult lesions he may meet with.

All forms of operative intervention in these vascular tumors harbor the great danger of hemorrhage. In most instances, this is alarming and exceedingly difficult to check.

The operation for the starvation of inoperable tumors by dissection and ligation of all branches of arteries distributed to the regions involved (Dawbarn) is not readily applicable to this type of tumor. The strangulation method has also proved ineffective, and the attempt at chemic decomposition with electricity or cauterization by means of a heated wire, has given results that have only been partially efficient. The injection of alcohol and preparations of iron have proven disappointing.

It remained for Dr. Wyeth to demonstrate that water at a high temperature injected into the neoplasm was a safe and curative agent, that through this agent the blood and albuminoids are coagulated, the resulting diminution and eventual disappearance of the tumor resulting through obliteration by granular metamorphosis.

Dr. Wyeth's procedure is a simple one. It is astonishing how little pain is experienced after the injection, which is done under ether or nitrous oxide anesthesia. Small children commence to play soon after the effects of the anesthesia have passed off, disregarding the increased swelling caused by the boiling-water injection.

Are there any dangers connected with the injection of boiling water into these neoplasms? The reply must be promptly given in the affirmative.

An injudicious use of boiling water may result in the sloughing of tissues, with a resultant infection. After an arduous delay cicatrization will take place, adding an additional defect to the already existing one. I may state here that it is not a simple matter to judge a boiling-water injection properly. If the angioma is in the neighborhood of the eye, the injection must be given with the greatest care, lest an injury to that organ may result.

Another matter, and one of vital import, is the danger of embolism. To preclude as far as possible such a danger, peripheral compression while the injection is being made becomes imperative. These are possibilities that must be reckoned with. They weigh heavily upon the mind of the surgeon who deals with boiling water and a cavernous angioma.

In making the injection certain conveniences will expedite this measure. A suitable syringe is essential. I have found an all-glass syringe with a good shoulder, a large ring on the piston, and an asbestos plunger to have answered the purpose better than any of the many I have tried.

A syringe with an all-glass plunger has its drawbacks, inasmuch as the steam generated within the barrel will find its way between it and the glass plunger, thus inhibiting the free and easy movement of the piston, so essential to this procedure.

The slip needle (small caliber) is the preferable one. With it no time is being lost in the transference of the boiling water. It should be always borne in mind that the water must be injected as near boiling temperature as is possible, and time is an important factor.

A pair of easy-fitting chamoisette gloves of good thickness have served me well. That portion of the glove intended for the little finger is cut off, so that the degree of heat in the tissues can be judged by occasional contact with the little finger.

The arrangement in the operating room should be such

that the surgeon stands between the vessel containing the boiling water (this vessel being kept constantly at the boiling point over a flame), and the patient, at a distance that will not necessitate a step on part of the surgeon for the transference of the boiling water into the tumorous mass.

The parts not involved in the tumor should be protected with moist cloths, lest a scalding of these tissues might result from the hot water in the syringe being forced out by the generated steam.

The introduction of the needle and the force applied in injecting the hot water is of great importance. Inasmuch as the weak tissues of the new growth do not offer the resistance of normal skin, which overlies the angioma, the hot water injected without great care may cause these tissues to break down. Injections made directly into the enlarged capillaries are invariably followed by a necrosis.

For this reason, it is well to make the initial injection through the sound skin about one-sixteenth and one-eighth inch from the edge of the angioma, well beneath the neoplasm, thus assuring coagulation of the deeper parent vessels. This is also a wise precaution against the dangers of embolism.

If the arteries leading into the tumor can be demonstrated, it is well to enter the needle along their course and inject sufficient amount of boiling water to cause coagulation in these vessels.

Judgment should be exercised in introducing the needle to prevent the point from resting too near the opposite wall of the tumor. To properly estimate this procedure, it is well to first introduce the needle without the syringe, and pushing it through the mass till it can be felt on the opposite side, then withdraw to the extent of half an inch. This will give a reasonable assurance that the boiling water can be injected into the tumor without the probability of sloughing. When the skin begins to turn grayish in color, the injection into that area is to be discontinued. Hyperdistention must be carefully guarded against. The amount of hot water

Fig. 1 Fig. 2 Fig. 3

Fig. 1.—Baby C., aged two years. Angioma of lower lip in left corner of mouth. When baby laughed this tumor would roll out of corner of mouth and appear as large as a California grape, dark purple in color. Three injections obliterated the tumor. First injection, April 6, 1914, 0.5 ounce. Second injection, June 3, 1914, 0.5 ounce. Third injection, October 11, 1914, 0.5 ounce.

Fig. 2.—Baby E., aged three years. Angioma involving left upper eyelid. This tumor grew rapidly during the last four months and interfered with vision. Two injections obliterated angioma. First injection, January 3, 1912, 2 ounces. Second injection, March 1, 1912, 1 ounce. Disappearance of tumor by July 1, 1912.

Fig. 3.—Baby G., aged eighteen months. Angioma of right cheek, complicated with a nevus. Four injections obliterated the angioma. First injection, September 10, 1913, 3 ounces. Second injection, October 12, 1913, 3 ounces. Third injection, December 6, 1913, 2 ounces. Fourth injection, February 18, 1914, 2 ounces. The tumor had entirely disappeared by June 1, 1914. The nevus was destroyed with two applications of von Paquelin's cautery.

Fig. 4

Fig. 5

Fig. 6

Fig. 4.—Peter E., aged nineteen years. Angioma on tip of nose and underneath upper lip. Two injections required for tumor underneath the upper lip, and three injections for angioma on tip of nose. Owing to the cartilaginous structure of the tip of the nose, much difficulty was experienced in making these injections. First injection, June 2, 1911, nose, 0.5 ounce; lip, 2 ounces. Second injection, July 8, 1911, nose, 0.5 ounce; lip, 1 ounce. Third injection, September 2, 1911, nose, 0.5 ounce. Complete disappearance by October 1, 1911.

Fig. 5.—Albert H., aged forty-two years. Angioma of tongue. Two injections obliterated the angioma. First injection, May 8, 1913, 2 ounces. Second injection, June 22, 1913, 1 ounce. Disappearance of tumor by September 1, 1913.

Fig. 6.—Baby M., aged seven months. Angioma of lower lip. One injection of boiling water obliterated the angioma. The angioma was injected with 1.5 ounces January 5, 1914. There was complete disappearance of tumor by April 1, 1914.

Fig. 7 Fig. 8 Fig. 9

Fig. 7.—Baby K., eighteen months. Angioma in left frontoparietal region. Two injections obliterated the angioma. First injection, May 2, 1914, about 2.5 ounces. Second injection, May 28, 1914, about 1.5 ounces. Disappearance of tumor by August 1, 1914.

Fig. 8.—John F., aged thirty-two years. Angioma of right middle finger near knuckle. One injection of 2 ounces caused tumor to disappear in six weeks.

Fig. 9.—Frank L., aged forty years. Angioma of left gluteal region. Five injections required to obliterate this tumor. First injection, February 4, 1910, about 5 ounces. Second injection, March 6, 1910, about 5 ounces. Third injection, May 2, 1910, about 3 ounces. Fourth injection, June 18, 1910, about 3 ounces. Fifth injection, August 2, 1910, about 2 ounces. Complete disappearance of tumor by November 1, 1910.

Fig. 10.—Mr. F., aged thirty-two years. Angioma behind right ear extending well down on neck. This patient had been subjected to a surgical measure with almost fatal results. Two injections were sufficient to cause obliteration of the angioma. First injection, March 14, 1909, 6 ounces. Second injection, April 18, 1909, 4 ounces. Tumor mass practically disappeared by June 1, 1909

Fig. 11.—Mr. F. Appearance of patient June 1, 1909.

Fig. 12.—Miss S., aged twenty-four years. Angioma of left cheek and upper lip. Ligation method with loops of silk tried and failed. Five injections of boiling water and one injection of alcohol obliterated the tumor mass. First injection, June 25, 1906, 4 ounces. Second injection, August 2, 1906, 3 ounces. Third injection, August 18, 1906, 2 ounces. Fourth injection, August 30, 1906, 1 ounce. Fifth injection, September 25, 1906, 1 ounce. Sixth injection, October 8, 1906, 1 ounce. Alcohol was substituted for boiling water on account of fear of too great a contraction with a possible deformity about the lip. Appearance of patient December 1, 1906: A slight scarring of upper lip occurred, the result of a superficial slough. The scar was excised a year later.

Fig. 13.—All-glass syringe, small size, for injecting boiling water into an angioma. Note the asbestos plunger, the large ring at the end of the piston, the shoulder of the barrel, and the point of the barrel ground to receive the "slip" needle.

necessary to cause this bleaching rests wholly with the amount of tissue under treatment. After coagulation of this particular area has been satisfactorily accomplished, the point of the needle is made to penetrate into another area and the hot water injected.

In this manner the needle is introduced into the tumor in different places, always from side to side, and at various angles, till the whole mass gives evidence of coagulation.

The quantity of hot water which may be injected at one sitting can amount to three or four ounces in a tumor the size of a hen's egg, the time consumed in making the injection being about ten minutes.

If, however, the new growth is of unusual size, it would be advisable to inject only a portion of the tumor at one time, making a subsequent injection two or three weeks later.

Angiomas under treatment with hot water must be scrutinized closely and the areas that have not been affected must be dealt with. In this manner a tumor the size of an orange may require two to four injections, the period of time for a cure being two to five months.

It is interesting to observe the characteristics presented by an angioma subjected to the hot-water treatment. The independence of the blood spaces from the bloodvessels of the surrounding tissue can be demonstrated by the fact that the neighboring tissue is not affected, *i. e.*, none of the hot water finds its way into the adjacent structures while the injection is being made. However, shortly after the injection an edema of the immediate parts begins to manifest itself. This edema may be very extensive according to the amount of hot water injected. Frequently, when the lesion is on the face, the swelling may become so extensive as to close the eyes.

Although the condition looks alarming, there is little ground for actual fear. The patient suffers no pain, the condition is an afebrile one, and the edema usually subsides within the first week.

It is a wise precaution to apply ice or very cold compresses to the tumor and surrounding tissues immediately after the injection for the first four to six hours, thereby lessening the severity of the edema. At the end of the first week the tumor, but slightly diminished, has almost fully lost its pathological color and the tissues are beginning to assume a normal appearance.

To the touch, the mass is hard. If it remains hard, the degenerative process is active and no further injection will be necessary. Should the tumor, however, begin to show evidence of softening with visible formation of new blood-vessels, an immediate injection is indicated.

The course of an angioma successfully injected is one of gradual diminution, the greatest progress being made from the second to the third week. A tumor the size of a hen's egg will usually require six to eight weeks for its disappearance. If the injection has been a fortunate one, *i. e.*, free from any accident, such as cicatrization following sloughing, the site that once harbored the angioma will appear healthy and quite normal.

To illustrate the gratifying results of this hot-water injection, the history of two cases will be found interesting.

Case I.—Miss S., aged twenty-two years, always in good health, splendid physical proportions and excellent physical condition—inclined to suffer from periods of marked depression. Since childhood had a small bluish spot on her upper lip and immediately below left eye upon malar prominence. Seven years ago the bluish spot on the lip began to enlarge. It continued to grow very gradually and was the size of a tangerine when she presented herself to me, June 6, 1906.

This was the condition of her face: The right side, excepting two-thirds of the portion of the upper lip, was normal. The left side showed a marked swelling of the cheek which pushed up the lower eyelid and encroached upon the left ala of the nose. About the malar prominence was an ele-

vated bluish spot as large as a pea. The left nostril was considerably flattened, about one-half normal. Two-thirds of the cheek showed involvement in a tumor mass that hung down over the under lip within one-quarter inch of the margin of the lower jaw. The tumorous mass was of a dark blue discoloration and was convoluted. Upon stooping, this mass would increase in size very perceptibly. The swelling was soft, the skin covering it appearing very thin to the touch. Upon pressure it could be readily made smaller by forcing the blood out of it. The evidence that there were cavities filled with fluid was unmistakable to the touch. The protrusion of the tumor was such that it was on a level with a line drawn from the tip of the nose across the cheek and down to the chin. The lower lip and the chin showed atrophic changes corresponding to the shape and contour of the tumor, caused by pressure of the overhanging mass. The incisor and canine teeth of the upper jaw had long been destroyed by the constant attrition of the tumor. Within the mouth there could be seen large bluish masses of mucous membrane lying between the molar teeth and filling about one-third of the cavity of the mouth. This caused an impediment of speech. Fear of biting this mass during mastication and causing free bleeding was a constant source of danger. It was a great discomfort to the patient because of the difficulty in eating. The patient carried the tumor in a sling partly because it relieved the weight and partly because it hid from view the unsightly mass.

Having had no previous experience with the hot-water injection, I spoke very discouragingly to her because I did not know how much good nor how much harm I might be able to do her should I undertake to interest myself in her behalf. She had been to a number of physicians, good and bad, during the last six years, seeking relief, but invariably returned home downhearted and discouraged.

The idea that occurred to me at first was to reduce the

pendulous part of the tumor with a procedure that incurred the least amount of risk. I thought this to be the ligation method, strangulation by introducing loops of silk subcutaneously along the mucocutaneous margin of the lip. With a very small cambric needle I ligated the lower third of the tumor. Small as the punctures were, the bleeding was most obstinate and continued for sixteen hours. With the aid of ice and pressure it was checked. The experiment demonstrated that it was not the procedure to be followed. The threads became infected and were removed on the fifth day. After nine days the infection had subsided. The condition remained the same excepting that about one-half inch of the lip on the right of the median line had contracted. Furthermore, hard nodules could be felt throughout the portion that had been ligated.

The condition, as it presented itself after two weeks, gave me considerable encouragement, and I concluded to resort to the treatment of injecting boiling water. The risks seemed to increase while I was debating with myself to use this method, and I spoke very frankly to the patient of what might happen. This case seemed to me to be one particularly prone to risks inasmuch as so much mucous membrane had to be dealt with. To inject water boiling hot into spaces filled with blood seemed to me an operation not free from danger.

The first injection, under aseptic precautions, was made on June 15, 1906. Under ether narcosis, four ounces of boiling water were injected into the tumor. The needle, a small aspirating needle three inches in length, was inserted into the swelling through healthy skin on the right cheek about one-eighth of an inch distant from the tumor margin, and about one-half inch below the nose. In making these injections the advice of Dr. Wyeth was closely followed. All of the tumor was injected excepting the portion of the inside of the cheek. It required about fourteen minutes to inject the four ounces of boiling water. Time was lost

by not having been able to obtain a Wyeth syringe. An ordinary glass syringe holding two ounces was used, the aspirating needle being attached to the syringe with rubber tubing. It was a clumsy way of doing this work, but it answered the purpose satisfactorily. The handling of boiling water is a rather delicate task.

While the injection was being made the patient's face was protected in the immediate vicinity of the needle so that the boiling water which was being forced out at the needle junction by the confined steam would not scald the skin. The hands of the operator were protected by a folded towel. It did not serve the purpose well, and I would suggest to those who have occasion to handle boiling water to use heavy duck gloves. To anticipate as far as possible any danger from embolism, peripheral compression was applied.

In introducing the needle, it was carried through the mass till the point could be distinctly felt through the skin. The withdrawing of the needle about one-half inch gave a reasonable amount of assurance that the boiling water could be gently forced into the diseased area without much danger of provoking any sloughing. The needle was introduced in four different places, at various angles. In some places the integument turned pale, in others an ashen gray, while the water was being injected into the tumor. The heat of the water could be very distinctly felt through the tissues—they were hot.

After the operation, the patient was put to bed. The following day the left side of the face was very much swollen but not painful. The left eye was closed. A large blister had formed along the mucous border of the lip. The tumor felt hard to the touch. There was a slight rise in temperature (99.6°). Two days later the temperature returned to normal. The patient left the hospital on the fifth day. On July 26 a large scab that had formed on the lip margin was removed. The whole tumor was hard (excepting about two-thirds of the tumor mass inside of the cheek). Diminu-

tion by granular metamorphosis had reduced the tumor to one-half its original size. I wish to state here that a linear sloughing of the skin occurred which extended from the ala of the left nostril to the margin of the lip. It resulted in a cicatrix that was but slightly disfiguring. This scar was removed at a subsequent time.

On August 2, under ether anesthesia, the buccal mucous membrane was injected with three ounces of boiling water. The outcome was most favorable, only a small slough resulting.

August 18, under ether anesthesia, two ounces of hot water were injected into the lip. Some difficulty was encountered in introducing the needle on account of the hardened condition of the tissues.

August 30, without anesthesia, one ounce of boiling water was injected into the buccal mass.

September 15, conditions began to take on a normal appearance.

September 25, without anesthesia, one ounce of boiling water was injected into the outer portion of the lip, which still appeared quite large. Ten days later the lip was almost normal.

On October 8 an injection of one ounce of alcohol caused the lip to assume so near a normal relationship that any further intervention was deemed unnecessary and the patient was discharged.

In substituting alcohol for boiling water, I wish to state that I feared too much of a contraction might take place with the use of boiling water and cause a deformity of the lip. I felt assured that in using alcohol the contraction would be but very little.

Case II.—Mr. F., aged thirty-two years; carriage painter; never seriously sick; was referred to me by Dr. C., Quincy, Illinois. As far back as fifteen years, he had experienced attacks of dizziness. During the last two years was unable to follow his trade (carriage painter) on account

of the severity of these attacks. Has had a small swelling behind his ear as far back as he can remember. Four years ago the swelling had grown to such a size that it crowded his right ear forward and extended into his scalp and down upon his neck.

The condition of the tumorous mass when he consulted me, March, 1909, presented these characteristics: Extending from the midparietal region near the centre of ossification on the right side, down to the clavicular region, the tumor occupied the entire right half of the occipital region, crowding the right ear markedly forward. The contour of the tumor was clearly defined. The mass proper was elevated to a level with the helix of the ear. That portion of the tumor involving the neck was of a bluish discoloration. Upon palpation a distinct pulsation and a bruit were readily detected.

With the application of pressure, the contents of the swelling could be easily forced out. Upon releasing the pressure, the tumor promptly reappeared. With touch the roughened bone margins and many irregularities of the skull underlying the tumor could be distinctly discerned. This destruction of bone was caused by the attrition of the pulsating mass.

About the lower pole of the tumor were a number of cicatrices, the result of an attempted operation. The patient informs me that he almost perished from loss of blood when the operation was undertaken.

The condition of this patient was one of extreme distress. The ringing and noises in his right ear were incessant. He was unable to be on his feet on account of vertigo and was compelled to sleep in a sitting posture.

An attempt was made to administer an anesthetic preparatory to the injection of boiling water. It was found, however, too hazardous a procedure, the influence upon the tumorous mass being such that it appeared as though it would burst.

The injection of hot water was made without an anes-

thetic and about six ounces were introduced. In making the injection, all factors of safety were considered. The scalp had been shaved and cleaned and during the injection peripheral compression was diligently exercised.

In making the injection the needle was first introduced at the lower pole in the neighborhood of the vessels that were leading into the tumor. As soon as there was evidence of coagulation following the injection, the needle was withdrawn and reinserted into the tumor at a different site. The needle was introduced about one-fourth inch from the mass. In this manner the whole of the tumor base was injected. After six ounces of hot water had been introduced into the mass, it ceased to pulsate. While the injections were being given, cloths wrung out in ice water were frequently applied to the mass, which had become quite hot.

The condition of the patient following the first injection, exclusive of the enormous swelling that followed (the edema involved the right side of the face, closing the right eye, and encroached upon the neck, throat and chest), was very encouraging. He appeared more comfortable, the ringing in his ear had ceased, and he was able to lie in bed.

At the end of four weeks, the growth had diminished to less than half its size. The patient could sleep well and was able to walk about without experiencing dizziness. A second injection of about four ounces of hot water was given at that time. Six weeks later, the tumorous mass had practically disappeared, excepting a small mass the size of a pigeon's egg at the angle of the mandible, which had the appearance of an enlarged gland. An attempt was made to inject it, but the substance was found to be too resisting.

DISCUSSION

Dr. R. S. Hill, Montgomery, Alabama.—I want to add one case of angioma to those reported by the essayist and I regard it a very remarkable case. The boy was brought

to my brother, Dr. L. L. Hill, from a distant city some five years ago to have his hand amputated. He was about six years old. The entire hand was involved and was three or four times as large as it should have been. Three injections of hot water about four weeks apart were made which reduced the hand more than one-half the size it was when we first saw him. Unfortunately the child was not brought back after the last injection, and I am therefore unable to give you the final result of the treatment. I am constrained to believe, however, from the improvement that was had during the times we were in touch with the patient, that it must have been a complete success. It seems only reasonable to suppose the child would have been brought back had not the improvement continued to a cure.

Dr. Herman J. Boldt, New York City.—I should like to add a case of cavernous angioma in another situation, the specimen and microscopic work I showed at the International Medical Congress in Berlin twenty-three years ago.

The patient was a woman on whom I performed vaginal hysterectomy for uncontrollable bleeding. She bled a great deal independent of her menstrual period, but more at that particular time. She was curetted, and the result of the curettage was we had to pack the uterus with styptic gauze. We took out the uterus and found a cavernous angioma about the size of a hazel nut.

These cases are exceedingly rare, but they do occur.

Dr. Charles H. Mayo, Rochester, Minnesota.—I want to support what Dr. Reder has said concerning the removal of these vascular tumors by injections of very hot water. It is a medical treatment that is at the disposal of all of us. If the water is not hot enough it does no harm. The danger comes from the use of too much hot water, *e. g.*, over-filling the region of the angioma and causing sloughing of the cheeks in infants. In tumors of great vascularity, such as these, radium works very well. It acts on the bloodvessels first, causing the angioma to contract.

Dr. Fred G. Hodgson, Atlanta, Georgia.—I want to bring out the same point Dr. Mayo has just made regarding the use of radium. I have been using radium for eight years, and find it especially useful in infants with beginning birthmarks or angiomata which are small. You can put radium on and protect it with a thin lead shield, stick on adhesive plaster, and

let the infant go to sleep. There is no pain connected with the treatment, and the growth disappears and leaves nothing but a white area. There is no particular scar.

In the angiomata which are larger, Wickham and Degrais, French surgeons, have suggested the idea that if we use two pieces of radium, a cross-fire shooting through the angioma will reduce it in size rapidly.

The cosmetic effect in infants with these growths on the face from the use of radium is very good. The growths disappear without leaving any scar. As I have said, there is no pain connected with the treatment. In infants it is by all means the best treatment to use.

Dr. W. R. Jackson, Mobile, Alabama.—I would like to ask the essayist if he has had any experience with C. O. D. in port wine marks on the skin?

Dr. Reder (closing the discussion).—Replying to Dr. Jackson I must say that I have had no experience with the so-called port wine marks.

I was pleased to hear radium mentioned in the discussion. What information I have was obtained from the literature. It all impressed me so encouragingly that I regret very much not having had the opportunity of observing a case under treatment. If an angioma can be made to disappear, to melt away, as some writers have expressed it, under radium emanation, then there remains no longer any doubt as to how these lesions should be treated.

With the radium treatment there seems to be absolute freedom from danger. This cannot be said of the hot water treatment. There is the contention of the anesthetic, the embolic danger must not be lost sight of and the picture of a slough is usually before the eyes of the surgeon for several days following the injection.

Furthermore, the technique in the use of boiling water is a refinement that cannot be acquired offhand, its correct usage can only come with experience. With radium such details need not to be reckoned with.

ANURIA DUE TO UNILATERAL CALCULOUS OBSTRUCTION

By Louis Frank, M.D., F.A.C.S.
Louisville, Kentucky

Suppression, not retention, of urine, either partial or complete, temporary or permanent, may be due to a variety of causes; and a complete study of the various causative factors is of more than academic interest. Upon such study necessarily depends the treatment, be this medical or surgical, or be it the determination that our efforts will be unavailing, and hence our policy one of watchful though hopeless waiting.

The scope of this contribution is limited to a consideration of anuria due to calculous obstruction above the bladder, and is further restricted to those of a unilateral type. It has been our fortune to have observed 5 cases of total anuria in which the causative factor was calculous disease of one kidney only, and it is this type with which we are concerned in this paper.

Sir Henry Morris's[1] chapter on calculous anuria must for all time remain a classic, and upon this topic, just as Tait in his chosen field, he has said almost the last word on the subject. But for the refinements developed in connection with cystoscopy, and the improvements in radiographic technique, the chapter might have been entirely closed.

Kümmel[2] divides anuria into what he terms a false and a true variety. False anuria is due to obstruction from some

cause, the kidney performing its function, although the purposes of it are not carried to completion. Such instances are seen in bilateral calculous obstruction, or in unilateral obstruction in the presence of a single functionating kidney. Excretion of urine continues until the blood-pressure is equalized, and there is then established true or renal anuria. As a matter of fact perfect equalization is not reached for many (14 to 30) days after the obstruction as evidenced by the edema of the tissues surrounding such an obstructed kidney. To this we shall later refer.

Renal anuria may then develop secondarily, or it may primarily ensue in: (*a*) diffuse nephritis, (*b*) kidney tumor, (*c*) disease of a single kidney, the other being absent; (*d*) from hysteria, and (*e*) from reflex causes, the latter being the most interesting from a scientific viewpoint. Reflex renal anuria is to be suspected, when, with one kidney and ureter normal, anuria sets in owing to the presence of disease, trauma or obstruction in the other kidney, and in such cases may be due to calculus, tuberculosis, hydronephrosis, nephrectomy, etc.

So far as we have been able to ascertain, there had been reported, previous to the publication of Watson's[3] paper in 1909, only 163 cases of calculous anuria, to which he adds, including one of his own, 25, making a total of 188 cases. We have examined the literature and have been able to add to Watson's collection only our own cases, although doubtless others observed and reported have escaped our notice. So it cannot be assumed that unilateral calculous anuria is such an infrequent occurrence, and we feel sure that the attention of the profession being called to the subject, and the value of the *x*-ray as a diagnostic aid being recognized, the condition will not be so often overlooked.

In our 5 cases, the first, although seen by three most excellent practitioners, was not suspected as being due to calculus, notwithstanding the history, until I saw the patient on the fourth day after anuria developed. Case II was

treated for a week by one physician, and, the second being called on account of the absence of the first from the city, led to a diagnosis. Case IV was treated by a young practitioner for four days for stomach trouble without a diagnosis, which was later made by a gentleman who had knowledge of Case I.

Watson[4] gives the causes as: (1) The blocking of the ureter of one kidney, the other being functionally incapable; (2) the blocking of the ureter of a fused kidney or the common stem of a fused ureter, two kidneys being present; (3) the blocking of the ureter of one kidney and the lessening of the function of the other by reflex influence, the latter organ being normal or but moderately diseased. He expresses the belief that, in the majority of cases of unilateral calculous anuria, the unobstructed kidney is either destroyed, functionally useless, or congenitally absent.

Legueu[5] holds that in unilateral calculous anuria the patient has carried on existence with one kidney only, *i. e.*, that the unobstructed kidney is always diseased, and the same view is expressed by Alberten,[6] Merklen[1] and others. Legueu asserts that three factors were required:

1. Long-standing change in one of the kidneys which has caused a diminution, if not suppression of its function.
2. A recent or recently aggravated lesion of the principal kidney (the calculus).
3. Followed by reflex inhibitory effect on the disorganized kidney.

He states the disease in the unobstructed kidney may be very slight, and consist of only epithelial exfoliation. How the presence of such slight evidence of disease is to be determined, I am unable to understand. Sections, taken post-mortem or at operation, of a kidney which has been subjected to cessation of function as a result of causes, which I shall presently show, must necessarily reveal microscopic pathologic changes. That, in many instances, the unobstructed kidney is the site of a definite lesion we feel sure,

and at times this may be quite marked, but we are equally certain this is by no means always true.

Götzl[7] produced, experimentally, total anuria by the ligation of a single ureter in dogs having two kidneys presumably normal. It is therefore not sufficient in assuming slight disease of the unobstructed kidney to demonstrate a lesion postmortem. The knowledge should be ascertained previous to obstruction. In two of the cases to be reported (Nos. 1 and 3), the urine previous to operation indicated a normal kidney, and since the operation the urine has been normal. Such findings would lead to the inference that such cessation of function may take place in a previously normal kidney, the excretion from the other being suddenly blocked or obstructed.

What then is the cause of this essential or true anuria? In some experiments with reference to the results of ligation of one ureter,[8] which were reported to this Society at its Washington meeting, the following observations were made: That a kidney might resume work even after six to eight weeks of obstruction of its ureter; that for a period of from two to five days, sometimes longer, after ligation (obstruction), the surrounding tissues were edematous, the veins enlarged; that after removal of the obstruction, the urine filtered through the kidneys very rapidly (polyuria); that *the unobstructed kidney became primarily intensely congested, arterial, then venous,* and very quickly hypertrophied.

These observations are confirmed clinically in the cases of calculous obstruction, and seem to explain certain symptoms and probably in certain instances failure of the unobstructed kidney to functionate. Likewise, the anuria occasionally following nephrectomy may, in the absence of a mechanical obstruction, find its explanation in the same causes. Kuster,[6] as also Israel,[13] believed that a vasomotor constriction might very rarely be the cause in such perfectly normal organs. Morris,[1] in the presence of an even slightly damaged kidney, would find a renorenal reflex as

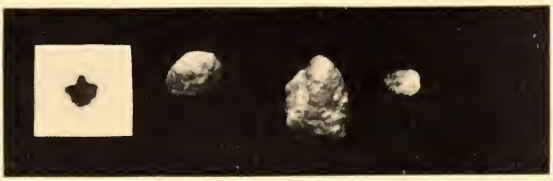

Fig. 1 (at left).—Calculus from Case 1. Fac simile of stone in size and shape.

Fig. 2 (middle).—Larger calculi from pelvis of kidney, Case 2. The larger stone was causing the obstruction.

Fig. 3 (at right).—Renal calculus passed by two-year-old infant, Case 5. This picture is slightly larger than calculus actually was.

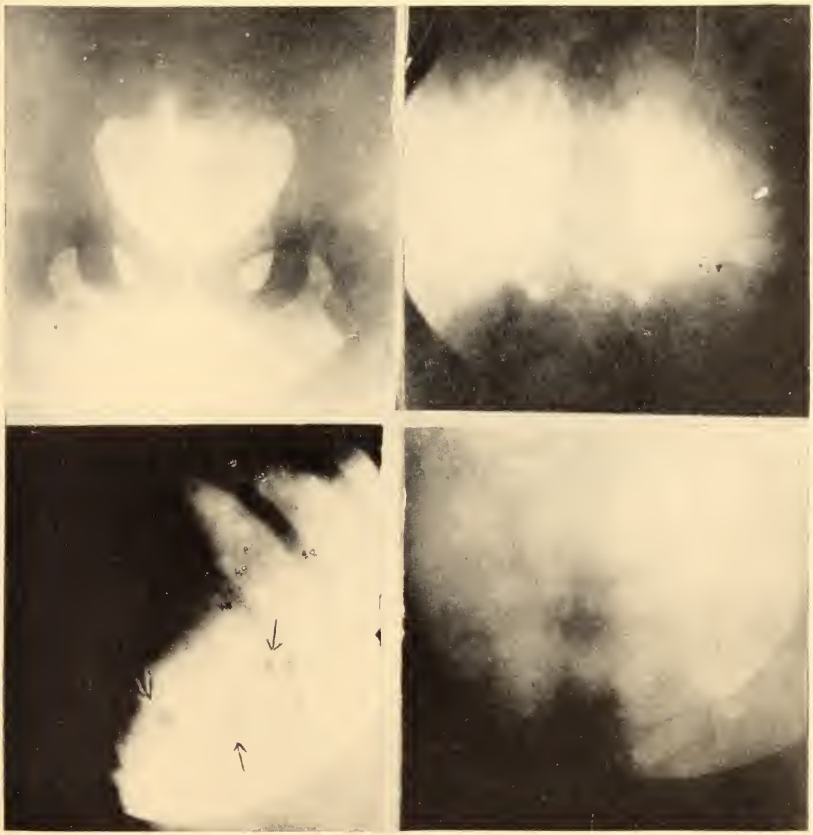

Fig. 4 (upper left).—Radiogram of pelvis in Case 1, showing no shadow along course of ureters. Picture twelve weeks after operation.

Fig. 5 (upper right).—Postoperative radiogram both lumbar regions, Case 1. No calculi shown in kidneys or upper ureters. Picture twelve weeks after operation. Stone had been passed.

Fig. 6 (lower left).—Radiogram of left kidney, Case 2. Four calculi shown. This plate was retouched before printing.

Fig. 7 (lower right).—Radiogram of pelvis of Case 3, showing calculi in the left ureter.

Fig. 8

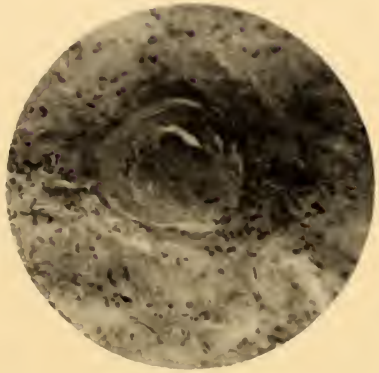

Fig. 9

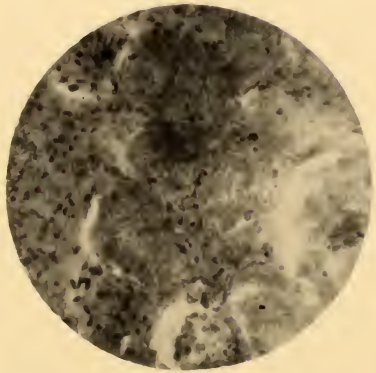

Fig. 10

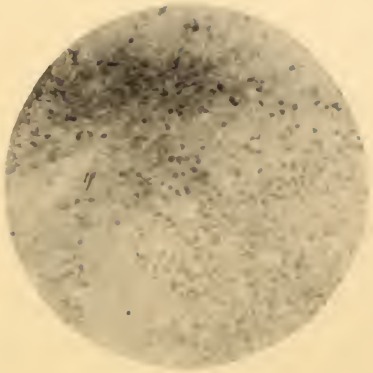

Fig. 8 (at left).—Microscopic section, left kidney, Case 2. Periglomerulitis.

Fig. 9.—Microscopic section. Case 2. Desquamative nephritis. Round-cell infiltration, left kidney.

Fig. 10.—Microscopic section of the right kidney, Case 2. Acute (suppurative) nephritis. Note the round-cell infiltration. The section is taken at the site of small abscess.

causative, but deemed such a reflex insufficient in a perfectly healthy kidney. In ligation experiments, the urine output of the unobstructed kidney is always at first moderately diminished, due to the altered circulation. Based upon this and the tremendous arterial congestion in the kidney, we have been led to believe that herein lies the cause of anuria in unilateral calculous obstruction patients. This is doubtless the congestion reflex—reflex congestion referred to by Israel in his thesis in 1888.

One of the two kidneys being put out of commission, the compensatory vascular activity in the other fills the afferent vessels with a volume of blood which cannot be cared for by the efferents. This permits further overdistention from the arterial side, and leakage from the arterioles adds to the direct pressure on the veins, further lessening the escape of blood (making a vicious circle) and mechanically as a result of this circulatory disturbance the kidney is overwhelmed with arterial blood thus interfering just as efficiently with urinary excretion as if the renal vein were ligated. Complete interruption of venous escape produces anuria, just as does permanent obstruction of urinary outflow from the kidney. It requires in the kidney pelvis a pressure of only 50 mm. of mercury to bring about equalization in the arterial flow and a practical cessation of excretion. We would therefore offer this circulatory disturbance as an explanation of anuria in the presence of one obstructed and a second good and normal kidney.

Before entering into a discussion of the recognition and treatment of unilateral calculous anuria, it may be well to report our cases, and in the discussion of them call attention to some of the salient points bearing thereon. Some of the preoperative histories cited may seem needlessly long and to contain matter of little importance, but are given in detail to show the slight disturbances with which these individuals may complain previous to the development of symptoms due to the obstruction or to the recognition of its cause.

Case I.—Mr. A. S., aged forty-two years; occupation, attorney; date of first observation, September 12, 1912. His personal history in reference to habits, previous disease, and family history, good. He has had no genito-urinary disease or bladder disturbance at any previous time. He has, however, at various times had attacks of renal colic, first on the right, then on the left side. These attacks were usually mild and have recurred at rather frequent intervals during the past seven or eight years. He has found it necessary to take morphine only twice to secure relief. Some blood and albumin were noted in the urine following two of these attacks, but disappeared in a few days. The quantity of urine was always normal during these attacks. Small uric acid calculi were passed upon several occasions, the last being in June, 1912. At that time a radiograph was made, and it was reported there were three small calculi in the left ureter. There is no history of his having passed these stones. The right side was reported negative. Following this he was seen by Dr. Crofton, of Chicago, Illinois, who made the diagnosis of "uric acid diathesis."

The present attack dates from September 4, 1912. On that date he took a horseback ride, this being his usual form of daily exercise. He returned from his ride very hot, took a bath, breakfasted, rested, and went to his office at 11 A.M. He had some nausea and dizziness, for which he consulted his physician, Dr. Sidney J. Meyers, who prescribed calomel. On September 5, 6, and 7 he did not feel well, but made no complaint of pain, nor could any history be secured of anything resembling an attack of renal colic, there being no distress which could be referred to the kidneys. Examination of the urine September 7 showed nothing unusual, the urine being normal as to quantity and characteristics; in fact, there were no symptoms referable to the genito-urinary tract. On the same day (September 7) at 4 P.M., he passed urine normally. When seen by his physician at 8 A.M., September 8, he stated that he had not

urinated since 4 o'clock on the previous afternoon, when he had also several stools. His blood-pressure was between 130 and 140 mm. Hg. (It was taken daily from this time until the date of operation, and was never higher than 150.) On September 9, he showed some mental distress, no urine had been passed, notwithstanding his physician had employed the usual methods to induce urinary secretion. Early in the afternoon a catheter was passed, but no urine found in the bladder. This was repeated at 5 o'clock, with similar result. Temperature, pulse and blood-pressure normal. Consultants were then called, the patient was given a brisk purgation, hot baths and sweating, with large quantities of fluids, and digitalis was ordered. September 10, his history was the same as that of the preceding day. There was no urine, no pupillary changes, no drowsiness nor headache, but there was a great deal of restlessness.

The patient was seen by me on the afternoon of September 11. There was some aching, dull pain on the left side, and on physical examination the kidney was apparently enlarged. The bladder was empty. In view of the history and findings the opinion was expressed that the anuria was due to unilateral calculous obstruction, and that surgical intervention was imperative. This was delayed for certain reasons until the next afternoon, viz., September 12, and during the interval he was given Fischer's solution intravenously. He was prepared for operation, without previously making an *x*-ray or cystoscopic examination. The reason for this was that the previous radiographic examination had shown stones on the left side, and the physical findings and history located the obstruction on this side. The history indicated two kidneys, and further we believed that little or no information could be obtained by cystoscopic examination.

The operation consisted of a nephrotomy done upon the left kidney under gas-oxygen anesthesia. An oblique incision was made, the kidney which was very large being merely

brought into the wound and split *in situ* from the superior to the inferior pole. It was observed that the perirenal tissues were edematous and infiltrated with fluid to a tremendous extent, confirming my belief that this was the obstructed side. As soon as the pelvis was opened, there escaped about 2 oz. of urine mixed with blood. Palpation revealed no calculi either in the pelvis or in any of the calyces, nor could a stone be palpated in the upper end of the ureter where it was within reach through the loin incision. A rubber drainage tube was placed into the kidney pelvis, and around it gauze was loosely packed and the patient returned to bed, the operation having lasted twenty-six minutes.

At 6.30 P.M., about an hour and a quarter after completion of the operation, he voided 5 oz. of urine. During the next few hours he passed 39 oz. per urethram and about 43 oz. through the tube, making a total of about 80 oz. within the first twelve hours after the operation. During the next twelve hours there came through the drainage tube 53 oz. of urine, the amount voided not being measured. The quantity remained large for two or three days, reaching the enormous total of 134 oz. from the obstructed kidney on the third day after the operation. During this time he was getting urotropin and large quantities of fluids. The quantity of urine then gradually diminished, the tube was removed on the eighth day, although drainage continued through the loin incision for three weeks longer. At that time the discharge from the back gradually ceased, and a few days later he passed a small calculus per urethram, accompanied by considerable pain and some obstruction to the urinary outflow. This calculus had a diameter of about 3 mm. It was very irregular in shape and had several sharp projections. It was brownish in color and moderately hard, requiring considerable pressure with a knife-blade to crush it. On the addition of acetic acid it showed no change, but the mass was readily softened by caustic soda. The micro-

Fig. 11.—Bladder and kidneys, Case 2. Note the large ureter of the right kidney. This kidney contained a large abscess at its upper pole.

scope showed it to be composed of uric acid crystals. The drawing which is presented herewith shows the exact size and shape of the calculus. (Examination of calculus made by Dr. R. Hayes Davis.)

During the past two years since this patient's recovery, radiographic examination has been repeatedly made of both kidneys, no stones being shown present. The urine has been normal as shown by numerous examinations, and he has had no further attacks of a calculous nature. He is attending to his business daily, and is perfectly healthy in every respect.

Case II.—Mr. E. B., aged thirty-five years, a resident of Waukegan, Illinois; occupation, machinist; came under my observation July 18, 1913. Family history negative. Previous personal history: Had an attack of gonorrhea at the age of seventeen, followed by urethral stricture, and was under treatment four years. With this exception has had no medical attention for ten years, and has apparently always been perfectly well.

His present illness began one month ago with acute, sharp pain in the region of the right costal margin, radiating downward into the pelvis and around the rib margin to the back. The pain became quite severe, and morphin was necessary to obtain relief. In three or four days pain became progressively less, and finally disappeared. The case was looked upon at this time as one of gall-bladder disease, and he was kept in bed for the next two weeks, during which time he was free from pain, but had no appetite, felt weak and tired, with temperature ranging from normal to 100° F. About July 10, he entered the hospital, where he was treated for typhoid fever. During all this time he never saw any blood in his urine, nor had he ever heard any doctor say it was present.

On July 12, he had acute cramp-like pain in the right kidney region, followed by the passage of a small amount of bloody urine, since which time no urine whatsoever had

been voided. He was given hot water enemata daily, an abundance of water to drink, catheterization was practiced, but no urine was found in the bladder.

On July 18, he came under the care of Dr. F. W. Koehler, of Louisville, who believing he had a calculous anuria at once had me see him. At this time he had a temperature of 102° F., pulse of 88, was much emaciated, lethargic and stupid, difficult to arouse. There were no pupillary signs, no edema, nor any convulsion or other signs, except headache and the mental symptoms indicative of uremia. Altogether he seemed most unpromising and by no means a good or safe surgical risk.

Radiographic examination showed the presence of four calculi in the left kidney, the right one being free of stones but the kidney itself seemingly much enlarged. Blood examination showed 13,400 leukocytes, 4,250,000 red cells, 85 per cent. hemoglobin and a pressure of 160 mm. Physical examination discovered a very large tender mass in the right kidney region and a large though painless left kidney. No urine was obtained by catheterization and none was voided. He was prepared for immediate operation, but was first cystoscoped after being placed upon the operating table. Two ureteral orifices were noted. The ureteral catheter was passed into the left ureteral orifice, which was edematous and swollen, as far as the pelvis of the left kidney without difficulty, on the right side, however, about 10 cm. from the ureteral orifice of this side, the catheter met an impassable obstruction. The bladder mucosa appeared normal. Bilateral operation was determined upon, the left kidney being operated upon first through an oblique incision. Four ureteral calculi were removed from the left kidney pelvis by pelviotomy. This kidney was also decapsulated, that is the kidney capsule was split almost the distance between the two poles and peeled back. It was noted at the operation that the muscles and perirenal fat were very edematous. The larger calculus,

the size of a small bean, had completely obstructed the ureter, and was lifted out of the ureteral orifice into which it was impacted. The kidney pelvis was drained with a tube, gauze being also passed around the kidney.

The right kidney was then exposed through an oblique incision five inches long. The structures on this side were not edematous. It was noted, however, that the veins in the perirenal tissues were greatly dilated, the kidney much enlarged, and its capsule tense. The pelvis of the kidney was opened and found empty. The capsule was split and the cortex exposed over two-thirds of its area. The perirenal fat was much compressed when first seen. A rubber drainage tube was placed in the kidney pelvis, and one gauze strip was also introduced. There was considerable oozing from the ruptured veins. Both incisions were partially closed with interrupted silkworm-gut sutures, and a gauze dressing applied. The two operations under gas-oxygen-anoci anesthesia required forty-four minutes for completion. Proctoclysis was started immediately after the operation, the rectum absorbing large quantities of water. Within the first twenty-four hours postoperative, there passed through both tubes a total of 90 oz. of urine, in addition to a large quantity which escaped into the dressings. In the next twenty-four hours the quantity was 70 oz., although again the dressings were thoroughly saturated, requiring frequent changing. His temperature, which had been 102° F. before, and 100° F. at the time of the operation, subsided to normal. Six days later it rose to 101° F. in the evening, receding to 99° F. the next morning. Urinalysis at that time (July 24) showed urine turbid, specific gravity 1008, reaction alkaline, light cloud of albumin, no sugar, no casts. A large number of pus cells were present, and many large masses of pus cells, a few red blood cells and epithelial cells. The leukocyte count was 11,400; 92 per cent. polynuclears; 7 per cent. lymphocytes; 4,000,000 red cells; hemoglobin 80 per cent. Both drainage tubes

were now removed, and both wounds explored with the finger, but nothing to account for temperature was found. The wound on the left side rapidly closed, but the right remained open, and a day or two later began to discharge considerable quantities of pus. He also at that time voided a large amount of pus from the bladder, and continued to do so.

On July 31, there were present in his urine a few large, pale granular casts, many leukocytes, phosphates, and epithelial cells. On August 2, there was a large amount of pus, a few casts, triple phosphates, and urates. The patient had gradually grown weaker, showing a daily elevation of temperature, and was clearly septic. He died on August 3, sixteen days after the operation, and twenty-three days after the beginning of the anuria.

At the autopsy no gall-stones were found present, the left kidney was large and soft, the right kidney showed an abscess which extended underneath the capsule, the pus pocket being about two and a half inches in diameter and communicated by a small sinus with the kidney pelvis. There were also present numerous miliary abscesses. The upper portion of the right ureter was found dilated to the size of the index finger, the dilated portion reaching to the brim of the pelvis, from whence it was normal in size. The lower end was invaginated into the dilated upper portion, which was filled with thick creamy pus. The left ureter was normal in appearance.

Case III.—Mrs. M. S., aged sixty years, was referred to me December 12, 1913, by Dr. Sidney J. Meyers, of Louisville. Her family history was negative. Previous personal history, good. With the exception of malaria, she had had no disturbance other than as hereafter mentioned. About six years ago she had an acute attack of cramp-like pain in the left kidney region, radiating to the bladder and the thigh. The pain was most severe and continued throughout the night and the following morning. During this attack

she suffered from nausea and vomiting, and a small amount of blood was noticed in the urine. During the following month she complained of a dull, aching pain in the left side radiating toward the bladder, which finally subsided and she had no further acute distress until the day before I saw her.

December 11, upon rising in the morning she voided a small amount of urine, and shortly afterward persistent belching began which was followed by sharp pain in the left kidney region, radiating over the crest of the ilium. About 8 A.M., she voided two teaspoonfuls of dark, bloody urine, since which time no urine has been obtained. Pain persisted during the day and night; it was always sharp, "dreadfully so," the patient stated. She vomited during the day and that night, and also the next.

I saw the patient about 5 P.M., December 12, and immediately sent her to the hospital, where she was catheterized, and no urine being found, she was sent at once to the *x*-ray room. Physical examination revealed no tenderness nor enlargement of either kidney, nor were any calculi or evidence thereof detected by vaginal examination. Temperature normal, pulse 68, blood-pressure, 150 mm. Hg., mentality clear, pupils normal, no headache. Radiography revealed three small calculi at different levels in the left ureter. These stones were in the pelvis and so near the bladder end of the ureter that we thought it might be possible to introduce a catheter beyond them and thus relieve the anuria. Ureteral catheterization was accordingly undertaken at once. The bladder contained no urine. The left ureter presented an edematous orifice, the surrounding capillaries being much congested. The right ureteral orifice was normal in appearance, as was also the bladder wall. In attempting catheterization of the left ureter, after trying two catheters, it was found impossible to pass either of them further than 5 cm. from the bladder. A catheter with a fine tapering "whip-tip" was then inserted, and with this we succeeded in passing

the first obstruction about 5 cm. from the bladder. A short distance above, a second obstruction was encountered, and after passing this with the catheter, there escaped urine to the amount of probably 1.5 oz. to 2 oz., which was turbid on account of the presence of blood and pus. The catheter was left *in situ* after injecting some liquid alboline into the ureter. A catheter was readily passed into the right ureter, presumably to the kidney pelvis. The urine obtained by catheterization of the left kidney contained many red and white blood cells, a few broad pale casts with fine and coarse granules, some hyaline casts with white and red blood cells attached. At that time there was no urine obtained from the right kidney.

The patient was placed in bed with the catheter *in situ* on the left side but not on the right. The next morning (December 13) 26 oz. of urine had been passed through the ureteral catheter, and 10 oz. per urethram. In the next twelve hours, 32 oz. were voided, and 34 oz. escaped by the ureteral catheter. The catheter was then removed, after injecting the ureter with sterile olive oil. The patient was kept in the hospital for five days. The urine became normal in quantity December 15. Urinalysis at the time she left the hospital, and further examination at the time of concluding this paper, shows the urine normal in every respect. Radiographic picture within the past week shows the calculi still present in the ureter.

(Note.—This woman has been repeatedly advised to have the calculi removed, but as she feels that recurring obstruction can be so easily overcome, she will not submit to any operative procedure.)

Case IV.—Mr. J. H. C., aged forty-three years, referred to me by Dr. L. L. Solomon, of Louisville. Date of first observation July 16, 1914. Family history negative. Previous personal history: Patient had usual diseases of childhood, and had an attack similar to present trouble about four years ago. Habits temperate. Was confined to

bed two months about a year ago with an attack which he describes as "shortness of breath," exact nature of the illness indefinite.

Patient states present illness began July 12, and that he has not passed any urine since. Has had no acute pain but complained of persistent "dull aching" in both lumbar regions. Similar attack, so far as related to pain, four years ago, lasting about a week, but was able to void his urine; there was some pain along the right ureter and at end of penis. Some calculi were passed at that time. Other than the above, he has now no other symptoms excepting nausea and vomiting. Stomach will not retain water longer than two hours. Persistent dull pain along course of ureter on right side, not so marked on left.

Physical Examination. Large fleshy individual. Lungs and heart normal. No tumor nor enlargement in abdomen. Kidneys not palpable. Right loin tender, and right abdomen rigid and tender over course of ureter. No urine in bladder. Temperature $98\frac{1}{2}°$ F.; pulse 76; blood-pressure 160 mm. Hg.; pupils normal; mentality clear; no headache.

Radiograph showed both ureters and kidneys negative for stone. Blood examination: Leukocytes 16,000; hemoglobin 80 per cent. Blood-pressure 6.30 P.M., 160 mm. Hg., next morning 140 mm.

Notwithstanding the *x*-ray showed no shadows, we believed this a case of calculous obstruction of the right kidney, and an immediate operation was advised. Through an oblique incision the right kidney was exposed, the surrounding structures and the fatty capsule were very edematous, the vessels dilated and prominent. The kidney was greatly enlarged, bluish in color, about three and a half inches in thickness, probably seven and a half inches in length, and about four and a half inches in breadth.

It was impossible, on account of the size and location of the kidney which extended upward to the eighth interspace, to bring it into the wound. Its capsule was therefore split

and peeled back on each surface to the pelvis. Three strips of gauze were packed loosely around the kidney, and the wound closed with chromic catgut.

The operation was performed under gas-oxygen anesthesia, and the patient returned to bed in good condition, with pulse of 90 and very shortly regained consciousness. However, urinary secretion was not reëstablished, and about twelve hours after the operation he began to show mild delirium. The next morning his temperature was 100¼°; pulse 98; respiration 22; blood-pressure 128 mm. Hg. He now began to show some edema of the legs and feet and beginning edema of the lungs, which later increased very rapidly and was the direct cause of his death two days after the operation and seven days after the onset of his anuric symptoms. During the latter twenty-four hours of his life, he had delirium, twitching, vomiting and other evidence of uremia.

Unfortunately no autopsy was obtained, but in view of the fact that this man had previously passed renal calculi and the clear history which he gave of the attack, with all of the classical symptoms of anuria due to calculous obstruction, I think there can be little doubt as to the cause of his anuria. We undoubtedly erred in this case in failing to open the kidney pelvis as it was very evident from the findings at the operation that the operated kidney was the one in which the obstruction existed, notwithstanding the fact that no shadow was shown by examination of the wet plate of the single radiogram which was made. It is of course possible that better preparation of the patient preceding the *x*-ray, or possibly another picture might have shown the presence of a calculus which may have been very small. An autopsy would certainly have been interesting, and it further seems to the writer based upon his past surgical experience in decapsulation of the kidneys, that had decapsulation been done on the unobstructed kidney the tension might have been sufficiently relieved to have permitted return of the secretory function by this organ. We shall

comment upon this later in discussing the treatment of these cases.

Case V.—The history of this case was related to me by Dr. W. H. Coleman, of Louisville, and is briefly as follows: A male child, aged two years, began to cry and complain of pain in the right side. The pain persisted for one and a half days, when the child ceased to complain, and it was also noted that the child had ceased to pass urine. The catheter revealed no urine in the bladder. After four and a half days, the child became unconscious, and the next day began to show edema. The eyelids became very much swollen and the eyes closed. The edema extended over the entire body. No urine could be obtained by catheter.

Seven days and thirteen hours after the beginning of the suppression, the urine began to pass in large quantities. The amount was not measured, but there was no doubt as to there being polyuria. Consciousness reappeared, the edema and other symptoms gradually disappeared, and fourteen days later, with some interruption in the urinary outflow, and with evidence of much distress, the child passed the calculus which I now have the pleasure of exhibiting to the Society.

A study of these cases at once makes evident the marked difference in many essential respects, as Morris has shown, between calculous anuria and the suppression of urine produced from other causes. He called attention to the very distinct tolerant stage which these patients have, and which may persist for a number of days, varying from two to twelve or fourteen. There is no definite time which may elapse before the tolerant stage ceases and the final uremic stage begins. In our first case this stage may have begun on the morning of the operation as indicated by the slight rise in the blood-pressure and the mental discomfort which the patient began to have. The duration of the uremic stage is also variable, as certainly in the child (Case V), although it had no convulsions its unconsciousness may

have been of uremic origin. It will be remembered that this unconsciousness lasted for three days, during which time no convulsions nor other evidence of toxic poisoning were manifest.

As indicated by the histories, the anuria as a rule begins suddenly. It should be borne in mind, however, that there may be periods of polyuria with recurrence of total suppression, indicating that probably the stone has shifted or that some temporary alteration of blood-pressure has occurred in the good kidney. In Case I, the attack began following exercise, and the symptoms which existed during the three or four days preceding the suppression may be assumed to be symptomatic of the impending total anuria. This patient complained of no colic at the time of the onset of symptoms, and it was only when the intrapelvic pressure in the kidney became great that he began to complain of aching in the obstructed kidney.

The fact has been noted in all of our cases, and this has also been borne out in the experimental work previously referred to, that the compensatory work of the unobstructed kidney is always attended with decided increase in its size. We have also made this observation in experimental unilateral nephrectomies, and have found in such nephrectomies, as in ligations or obstruction of the single ureter, that the enlargement of the kidney is permanent, and that organ becomes hypertrophied.

Case II bears out the observations of many previous observers and would seem to lend much weight to the statement made by Morris, that "the most important clinical feature in cases of calculous anuria is the fact that it denotes the patient possesses only one functionally active kidney, the other being absent or destroyed by previous disease." While we do not, as stated, agree with this dictum, still had we borne this in mind, the result in Case II might have been different. Undoubtedly this individual, as shown by the autopsy, must have had probably a

previous temporary partial obstruction in his ureter. This is the only explanation for the tremendously dilated ureter, and it would also serve to account for the right-sided pyelonephritis which was evidently an old disease. His kidney infection on the right side preceded the calculous obstruction on the left, and such a case would bear out the observations to which we have previously called attention. It is quite likely that there may have been a partial or temporary obstruction on the right side by the pus which was finding its way through the ureter, and that this obstruction resulted in an acute exacerbation of the infection. A further observation in this case, and one which we have previously made on the operating table and to which attention has been called in a recent publication by the writer, is that obstruction may occur in a ureter which is partially dilated by invagination of the undilated portion. In this particular instance it was in the nature of an intussusception. A right-sided nephrotomy in this individual might also have saved his life. At the time in his postoperative history when the temperature again began to rise, it was not believed that he could withstand further operative intervention; but had we known the condition of this kidney, or had we suspected it, I dare say further steps would have been taken to save the patient.

In discussing the symptoms of calculous anuria, it would seem to us that probably the most important feature in connection with anuria of this kind is the absolute absence of any disturbance in these individuals aside from lack of urinary secretion. Usually, a history of preëxisting calculous colic may be obtained, but this is not always the case, and certainly in the very young would hardly be possible to obtain. It must be borne in mind that obstruction due to calculus may occur in the very young. Our own case is by no means either the youngest or the only one which has been observed in infants. Morris quotes two cases of Rayer's "infants at the breast, aged two days and eight days, who died in convulsions which were the result of small calculi."

Realization of the possibility of the causation of anuria should lead at once to a thorough cystoscopic and radiographic examination. However, if this is impossible for any reason, and even if such examination should be negative, with a clear history and a fair presumption as to the cause of the obstruction, operative intervention is urgently and immediately indicated. The fortunate outcome in Case V is certainly no argument in favor of postponement of operation. It may, however, be well after the stone has been located by the *x*-ray, or even if such cause of obstruction has not been clearly detected, to pass or attempt the passage of the ureteral catheter. It may be impossible, as in Case IV, to introduce the catheter past an obstruction due to such invagination, but the fortunate relief of the anuria in Case III would indicate that this method of relieving the patient may be tried. Krebs,[9] in 1903, relieved anuria by such ureteral catheterization, being able in his case, as I was in my own, to pass the catheter beyond the obstructing calculus. We were not at the time aware of Krebs' recommendation, therefore, so far as we were concerned, the method was original. I am sure that in a goodly number of such cases the procedure might be followed by success. In our own case, as has been said, this patient has had no further symptom due to the calculi, although she still has these same calculi resident in the ureter. I do not believe, however, such fortunate relief will be obtained should the stone be located high in the ureteral tract, for reasons which are very evident, although it is possible an obstructing stone may be dislodged from the renal end of the ureter by means of the catheter. It also seems to us that if for any reason immediate surgical intervention is not undertaken and it is impossible to pass the obstructing stone, lavage of the unobstructed kidney through the catheter may be of some benefit in reëstablishing kidney secretion. In addition to this, purgation and depletion for the purpose of lowering blood-pressure may be useful in

attempting to restore the flow of urine. The present methods in vogue of giving digitalis with large amounts of water and other diuretics is to be deprecated and condemned, as they only tend to raise the blood-pressure and make bad matters worse. Should relief be obtained by the foregoing plan, later removal of the offending calculus should be insisted upon. In our own case (Case III) repeated advice to this end has been unsuccessful.

Treatment should be promptly instituted. The mortality by non-operative or expectant means is very high, ranging from 70 per cent. to 80 per cent., whereas in the cases which have been treated surgically, the mortality is only half as great, varying from 40 per cent. to 45 per cent. With earlier recognition and prompt surgical intervention, I feel sure the mortality will be even less. Even late operations have at times been successful. Demon[10] reports a case operated upon as late as the eleventh day, and Chevalier[11] cites a case operated upon the fourteenth day, both with recovery. Late in the obstruction some of these individuals may be saved as indicated by the fact that Paget's[12] patient lived twenty days with anuria, and Russell[13] reports a case living twenty-eight days with anuria, both ending in complete recovery after relief of the obstruction. Notwithstanding recoveries after obstructions of such long duration, it must be borne in mind that here, just as in the obstructed bowel, each day that the obstruction exists adds tremendously to the risk and minimizes in equal proportion the chances of recovery. While the obstructed kidney may resume its function even after a number of days, it is not necessarily the case that it must do so even after obstruction of very short duration.

The nature of the operation to be performed is in some respects a matter of choice. *Speed* and *expeditiousness* are, however, quite necessary. The obstructed kidney must either be nephrotomized or pelviotomy should be done. Personally, we prefer opening the kidney pelvis if this

can be done quickly, as the object to be attained, viz., the release of intrapelvic pressure on the bloodvessels, is just as thoroughly and permanently overcome in this way as by section of the kidney. There are also some dangers from hemorrhage, both primary and secondary, from nephrotomy, which must not be ignored and which one does not consider in opening the kidney pelvis. Hence the latter operation is equally efficient in securing the desired results and is far less dangerous. Israel[14] has suggested, and very wisely we think, the great mistake of suturing a kidney which has been nephrotomized for the relief of obstructive anuria. The reason for this is very evident. Decapsulation of the obstructed kidney is absolutely valueless. We have ascertained this experimentally since operating upon Case IV. Decapsulation of the unobstructed kidney, should such kidney not be extensively diseased, and particularly should it be normal, may restore the secretion to this kidney. Such restoration, however, should not be an excuse for failure to relieve the obstruction in the other kidney, as, unless this is done, the obstructed organ will shortly be completely out of commission. Should any doubt exist as to which kidney or ureter is obstructed, there is no objection to doing a bilateral operation. We think if pelviotomy is performed, the dangers are not increased, and even if so is in no degree commensurate with the good which may be accomplished. Bilateral nephrotomy even may be desirable. It is by no means necessary to remove the calculus at the first operation, and time should not be wasted in attempts to do so or in a search for the stone. Should the calculus be in the pelvis of the kidney or within reach in the upper ureter, its removal would necessarily be a feature of the operation. Should a single calculus be present in the lower end of the ureter, and the kidney pelvis be opened, or a nephrotomy be done, such a stone may be dislodged and pushed into the bladder by means of the ureteral catheter passed from above. Prolonged attempts or manipulations

looking to the removal of calculi which may be present are unnecessary, the reason for the operation being not primarily the removal of the calculi, but reëstablishment of the kidney function. Not infrequently, and particularly should the calculi be small, with reëstablishment of kidney function and regression of the edema in the ureter, especially should the stone be single, it will in all likelihood be passed onward into the bladder. Surgical intervention should, however, in no instance be delayed more than forty-eight hours, no matter what kind of treatment may have been instituted previously, and in some instances it should not be delayed so long. As Walton has well said, absence of uremic symptoms and an apparently good condition of the patient, is absolutely no excuse for delay.

(NOTE.—Anesthesia—would call attention to G. oxygen.)

REFERENCES.

1. Morris. Diseases of Kidney and Ureter.
2. Kümmel. Berliner klin. Woch., 1909, Nos. 16 and 17.
3. Watson. Amer. Jour. Med. Sci., April, 1909.
4. Watson. Obstructive Renal Retention, etc., Massachusetts Med. Society, 1904.
5. Legueu. Assoc. Franç. d'urologie, 1907, p. 561.
6. Kuster. Krankheiten d. Nieren.
7. Götzl. Pflugger's Archives, October, 1899.
8. Frank and Baldauf. Trans. Southern Surg. and Gyn. Soc., 1911.
9. Krebs. Petersburg med. Wochenschrift, 1903, No. 52.
10. Demon. Annals de Maladie d. organ. Urin., 1894.
11. Dohlin. L'anuria Calculeuse, 1896.
12. Kuster. Chir. d. Nieren, pp. 55 and 56.
13. Loc. cit.
14. Israel. Chirurgische Klinik d. Nieren Krankheiten, 1901.

OTHER LITERATURE CONSULTED.

Watson and Cunningham. Diseases and Surgery of Genito-urinary System, 1901.

Walker. Genito Urinary Surgery, 1914.

Kelly and Burnham. Diseases of the Kidney, Ureter and Bladder, 1914.

Cabot, A. T. Annals of Surgery, xxxviii, 503.

Cumston. Annals of Surgery, xliv, 32.

Beran. Annals of Surgery, xxxvii, 575.

URETER STONES: THE TECHNIQUE OF THEIR REMOVAL BY CYSTOSCOPIC METHODS, WITH REPORTS OF CASES

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It will hardly be necessary before this Association to plead the cause of early removal of a stone, once it is identified as impacted in the ureter; if held there for long, whether large or small, its damaging effects are sure and not long delayed.

The one question still under discussion is, what is the best method of removing it?

Lester Leonard[1] said that in view of the frequency with which ureteral calculi are passed voluntarily (he claimed that 50 per cent. of all cases were thus relieved), the expectant plan, inviting this outcome, should be relied on in all cases; whereas, on the other hand, we may read in the many essays of modern surgeons the advice to remove them by open abdominal operation, immediately the diagnosis is determined. No middle ground is accepted or entertained by these, and no consideration is given by many of them to cystoscopic methods of removal.

It would seem reasonable to assume that if the profession were acquainted with a method more sure of success than is the expectant plan (only 50 per cent. successful), or less radical and dangerous than the abdominal operation, it would be willing to give it recognition and also to make use of it. That open operation is ordinarily attended with

most gratifying success and prompt recovery, does not change the fact that its outcome is not always satisfactory, nor is its employment always easy.

Medical literature of recent years contains many reports of experiences with open operations for ureteral stone removal, together with the impressions of the authors. From these it is apparent that such work is far from being uniformly easy and satisfactory.

Deaver[2] tells us that the open operation for the removal of a calculus situated low down in the ureter may be one of the most difficult that he undertakes.

A considerable number of the best operators in this country have been observed to search in vain for the supposed stone; or have reached it only after the quest has lasted for one or two hours. And they were happy, though not content, at finding it even then.

But the operator's troubles are not always over at the end of such a successful operation. Moschowitz[3] has related the appalling developments in one of his cases, in which hemorrhage occurred from both iliac vessels, subsequent to an operation done on each side of a patient; and the narrow escape from gangrene of the lower extremities.

Peterkin[4] has recited the dramatic and tragic sequences following the use of open operations in three cases in his hands. They varied from prolonged infection, suppuration, fistula-formation, and invalidism to death.

In a previous paper (5) by the writer other reports of a similar kind are quoted. But more important than this is the question of mortality. Tenney has studied the mortality connected with such open operations and has concluded that it varies fron 15 to 20 per cent. This alone is sufficient to evoke the wholesome respect of a profession devoted to conservatism and safety-first ideals.

If such be the case, it is only fair to say that while such operations should be carried out when required, their application should be avoided if the removal can be effected by

a less hazardous procedure. This latter, if such there be, should at least be given a trial before resort is had to the more radical procedure.

A method less hazardous than open operation has been evolved; has been developed to a tangible and serviceable reality; and has proved its efficacy in a sufficient number of instances to justify its general recognition and its adoption by preference in all appropriate cases.

Cystoscopic manipulations of various sorts have succeeded in removing ureteral stones in a very considerable number of cases (probably a hundred or more, up to the present date). Successes have been reported by Howard Kelly,[7] Braasch,[8] Young,[9] Kreissl,[10] Ashcraft,[11] Moschowitz,[12] Casper, Schmidt, Robert Bryan,[13] Harvey Moore,[14] Perrier,[15] Hunner (personal communication), myself,[16] and others.

A formulated plan, together with instrumental equipment, was submitted by the writer and its use was reported on at the Cincinnati meeting of the Mississippi Valley Medical Association in 1904, and further discussion of the method was presented[15] before the American Urological Association in 1912.

This plan and equipment have been amplified and improved since their original presentation, but there has been no cause for regret in any instance in which it has been adopted. On the contrary, in the cases in which it has proved successful the patients have expressed their gratification and intense appreciation of the simplicity and innocuousness of the precedure, which had not menaced life or put them to serious inconvenience; while in cases of failure it has left the patients in no worse condition for the open operation than they would have been without it.

The writer would not like to be understood as making immoderate claims of unvarying success of the method. With certain cases it is feasible; with others it is not. Judgment and accurate diagnosis must be applied to determine the probabilities in a given case. But in numerous

cases in which there is room for doubt as to the outcome, the patient should be given the benefit of this doubt. The less radical procedure should at least be given a trial before subjecting him to one that possesses elements of risk not inconsiderable.

The cystoscopic maneuvres that have been reported as giving successes in the removal of calculi have been mainly two. The injection of oil through a ureteral catheter, with the object of promoting the descent of the stone, and the teasing of a stone out of its niche when hung in the ureteral orifice.

While these measures are commendable and often successful, they are inadequate in many cases, and the more aggressive measures permitted by the operating cystoscope and its appurtenances should give much greater efficiency and reliability.

Gratifying results were obtained with the operating cystoscope submitted in 1904, but its deficiencies led to the devising, during the present year (1914), of a new model, which not only accomplishes all the objects aimed at by both this and the Universal cystoscope of the writer, but accomplishes them much better. In other words the new model *Universal and Operating cystoscope* consists of a single sheath of No. 23 French, outside caliber, that permits the use through it of observation telescopes (direct, right-angle and retrospective), of catheterizing telescopes, and the several operating accessories (forceps, dilators, scissors, etc.), essential for the work.

The great advantage derived from free irrigation while the operator is at work has been retained in the present model. The shafts of the accessory instruments are now made flexible to permit of their use at an angle ("around the corner") as well as by the direct method.

This also permits the instruments (forceps, etc.) to thread the curves of the ureter to a much greater distance than the straight instruments with fixed shafts.

If constrictions are located high up in the ureter and beyond the reach of the metal accessories, reliance may then be had on flexible dilating bougies or catheters (Fig. 2) for widening the tract and paving the way to displacement and descent of the stone. The following case reports will serve to illustrate some interesting experiences in this work.

Case I.—Stone symptoms nine months; cystoscopic manipulations; descent of stone shown by *x*-ray; recovery. Chas. C. M—r, aged twenty-four years, East St. Louis, Ill. Arrived July 7, 1914. Symptoms began nine months ago; attacks of renal colic recurring every two or three weeks since that time, requiring the liberal use of morphin hypodermically. Catheter and *x*-ray showed a stone shadow about the crest of the right ilium. Oil injection. July 7, observation showed a stone emerging from the orifice of the right ureter. Attempts to grasp it pushed it further in but the orifice was dilated. On looking into the bladder next day it was at once seen that the orifice was clear, and the stone lay in the base of the bladder. It was picked up and removed with alligator forceps. A catheter passed easily then into the pelvis of the kidney, and there were no more symptoms—the first relief for nine months. The stone was recovered and is shown herewith.

Case II.—Symptoms thirteen months; open operative removal of one stone; cystoscopic removal of another from the same ureter. J. S. F—l, aged forty-four years, foreman of a telephone company. April 2, 1914. Symptoms of recurrent renal colics for past thirteen months. Diagnosis of right renal stone was made a year ago by a physician who assured the patient he could dissolve it in a little time. This plan not having succeeded the patient came to me a year later. By ureteral catheterization and *x*-ray a stone was demonstrated to be in the right ureter, about three inches above the lower end (Fig. 18). Dilatings and oil injections failing to bring this down, it was removed by open operation on April 28, 1914. Recovery and closure

of the wound followed satisfactorily, but a month later a sudden elevation of temperature led to the use of the cystoscope and ureteral catheter, and it was discovered that another stone existed in the right ureter a half-inch above the orifice, plainly evident to *x*-ray and in contact with the catheter. With the operating cystoscope the orifice was incised with ureteral scissors. This was followed on the same night by the passage of a good-sized stone (Fig. 19), and permanent relief from further symptoms. The stone was recovered and is in the collection shown.

Case III.—Symptoms two months; cystoscopic measures, recovery. T. A. M—r, aged twenty-five years; Laredo, Mo., December 1, 1911. History of two months' duration, severe attacks of pain in left ureteral region, often requiring the use of morphin hypodermically, yet lasting two or three days and recurring about once a week. Friends had difficulty in holding him in bed on account of the severity of the pain.

While the left ureteral orifice was visible through the cystoscope, a catheter or bougie was obstructed about three-quarters of an inch from the opening. *X*-ray (Carman) showed shadows at this location. Operating cystoscope was then used, the dilator entering only a short distance, where it seemed obstructed. Dilation was essayed but could not be executed to advantage until the opening had been enlarged with ureteral scissors. Dilation was then effected and was repeated three days later, followed in two days by the voluntary passage of a ureteral stone and complete relief from pains and colics. After this there was no more obstruction to the passage of catheters up this ureter. The stone is included in the collection.

Case IV.—Ten months of symptoms, cystoscopic measures, recovery. A. DeL—y, aged thirty-eight years, American, salesman, St. Louis, June 7, 1913. Attacks of renal colic began ten months ago, the first one accompanied with suppression of urine lasting a day. Cystoscopy;

right ureteral orifice healthy; left congested and inflamed; bladder excitable. Catheter obstructed three-quarters of an inch within the ureter. After using the ureteral dilator on this orifice, adrenalin solution was injected into the ureter through the catheter and the patient was sent to the hospital. Within three hours afterward a ureteral stone was passed and recovered by the patient. Complete relief. Stone included in the collection.

Case V.—Recovery after cystoscopic measures, following two years of recurrent ureteral colics of severe degree (bilateral). F. S—r, Butler, Pa., aged fifty-nine years, lecturer, December 22, 1908. Patient first began having renal colics two years ago, but they have been especially severe during the past few months. Pain most intense in lower ureteral region, left side, lasting recently twelve hours, notwithstanding morphin; coincident reaction of both testes. Urine bloody. Excruciating sensitiveness of the posturethra and bladder on attempts at instrumentation. Obstruction to both ureteral catheters, on left side at 1 inch above the orifice; on the right side at 1½ inch. *X*-ray shadows at corresponding distances on both sides. Several successive cystoscopies were done in the following month, attended with dilatings of both ureteral orifices, attempts at grasping stones, and injection of oil, etc. While success failed at grasping the stones, the patient passed three small calculi at one time finding them in a glass which he was required to use for voluntary urination. The finding of these was preceded by marked alleviation of the ureteral pain and improvement in the local conditions of irritation and urgent frequency, etc. And on the following ureteral catheterization (January 9), both catheters passed easily into the renal pelves. Relief from former symptoms was complete and permanent, as indicated by letters from the patient received a year later.

Case VI.—Bilateral calculi; symptoms fifteen years; relief after cystoscopic measures. S. H—, aged forty-three

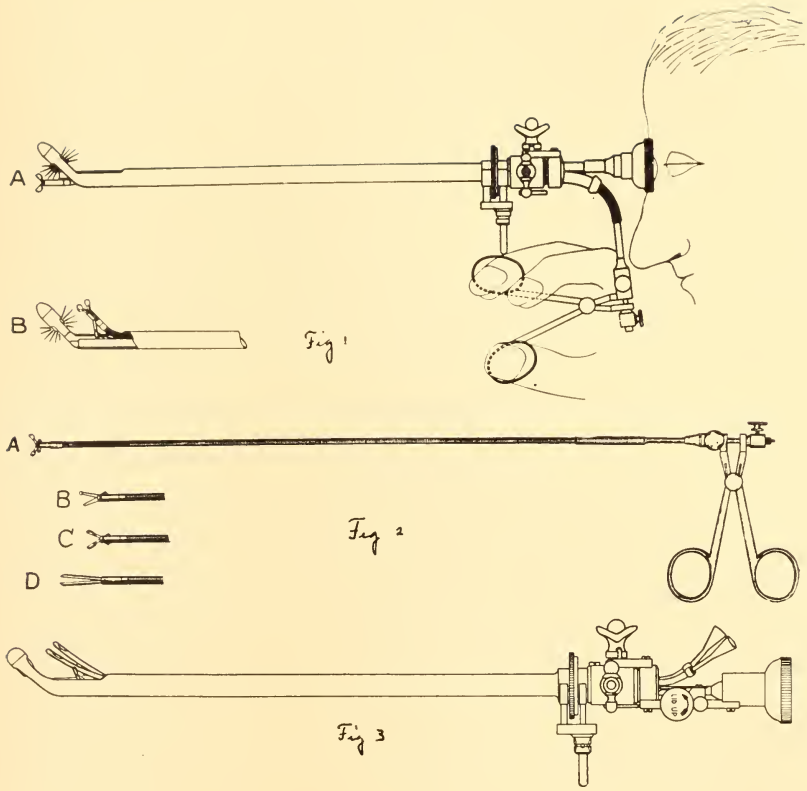

Fig. 1.—The Bransford Lewis combined universal and operating cystoscope, latest model, 1914. *A*, forceps in use by direct method; *B*, same by indirect method.

Fig. 2.—Appurtenances to Bransford Lewis universal and operating cystoscope, model, 1914. *A*, flexible biting forceps; *B*, scissors; *C*, stone forceps; *D*, ureteral dilator.

Fig. 3.—Double ureteral catheterization, indirect method.

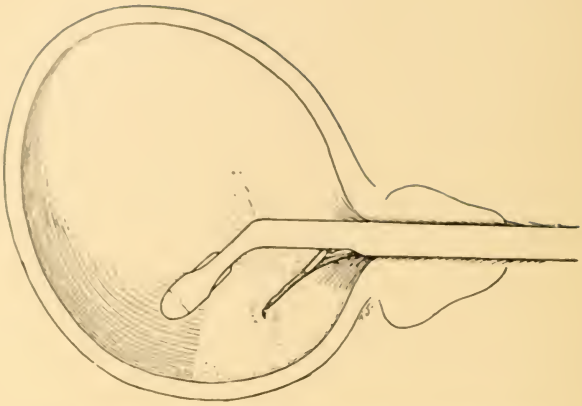

Fig. 4.—Indirect method of ureteral catheterization.

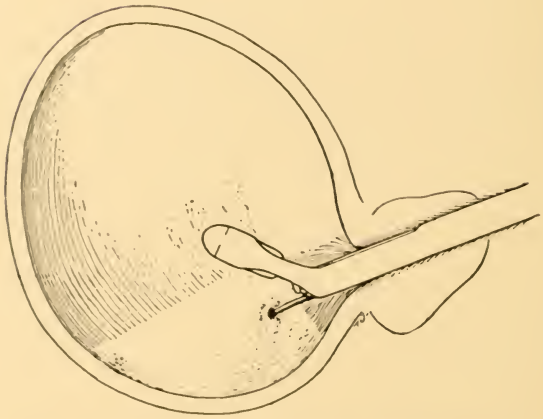

Fig. 5.—Direct method of ureteral catheterization.

Fig. 6.—Catheter approaching left ureteral orifice, direct method. Cystoscopic view.

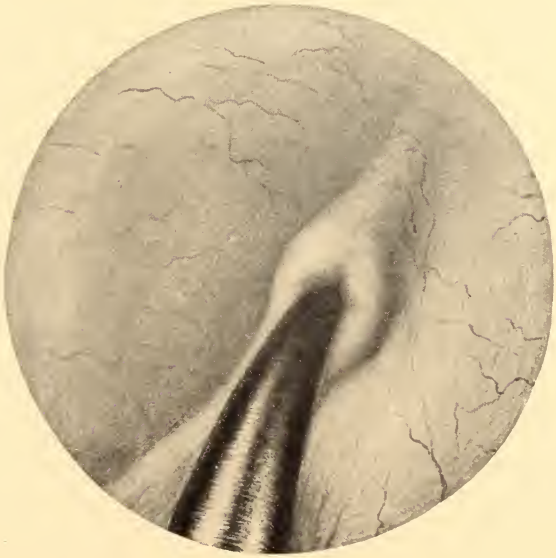

Fig. 7.—Catheter passed up left ureter; direct method.

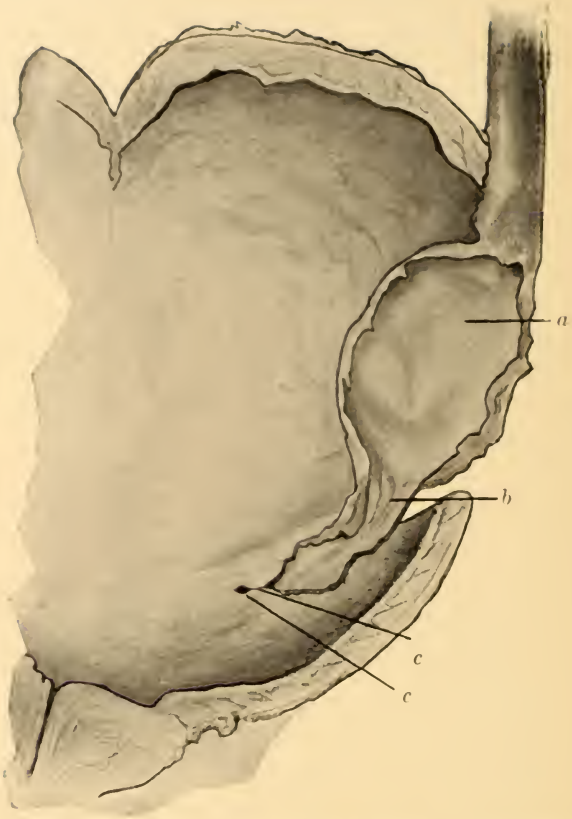

Fig. 8.—Pathological specimen, showing strictured ureteral orifice and dilatation above. *a*, dilated left ureter; *b*, narrowing of ureter; *c*, minute strictured orifice.

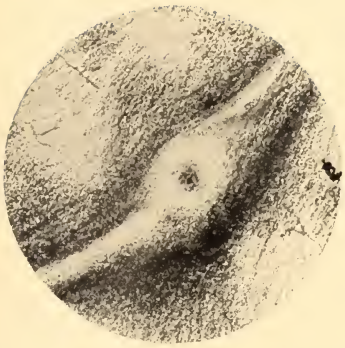

Fig. 9.—Cystoscopic view of strictured ureteral orifice (left).

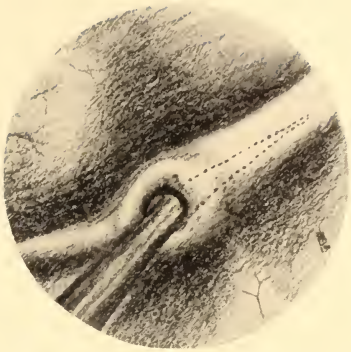

Fig. 10.—Dilating sound in strictured ureter.

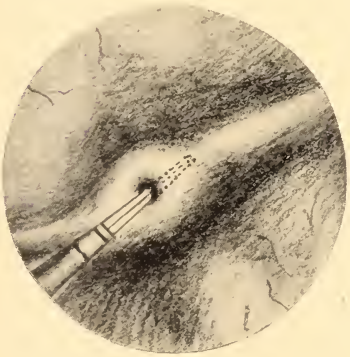

Fig. 11.—Metal dilator in strictured ureteral orifice.

Fig. 12.—Metal dilator distending ureteral orifice.

Fig. 13.—Ureteral scissors engaged in strictured ureteral orifice.

Fig. 14.—Effect of cutting with ureteral scissors.

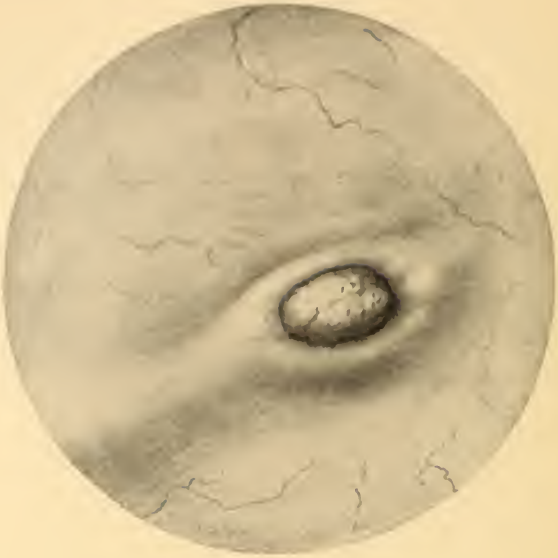

Fig. 15.—Stone impacted in left ureteral orifice.

Fig. 16.—Removal of stone shown in Fig. 15.

Fig. 17.—Forceps grasping stone in lower ureter

Fig. 18.—Stone about three inches from lower end of right ureter; catheter in ureter. Before manipulation.

Fig. 19.—Same as Fig. 18 after descent of stone, one-half inch from orifice.

Fig. 20.—Stone of Case 2 after removal. Actual size.

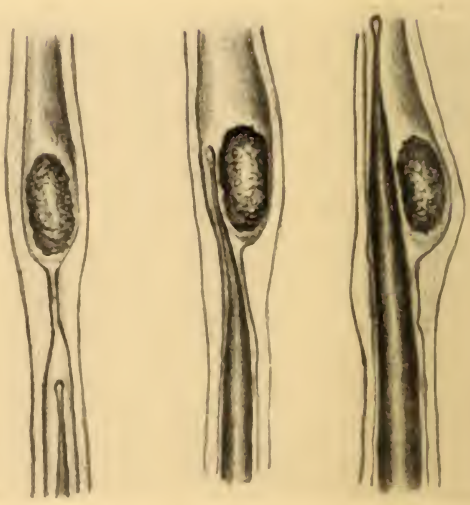

Fig. 21.—Manipulation of ureteral sound when stricture and stone are located higher up in the ureter.

years; attorney, Sherman, Texas; arrived October 20, 1905. Original attacks of renal colic began fifteen years ago; recurred at frequent intervals until January of the present year, since which time they have been much more frequent and severe. Sharp lancinating pain extending down the left ureteral region into the bladder and left testis; often causing the latter organ to inflame and swell (epididymitis). Large amount of morphin with the last attack of two weeks ago, which was attended with a chill and a temperature of 103.5° F. Examination: Urethra hypersensitive, bleeding even after the use of a soft rubber catheter. On cystoscopy, both ureteral catheters were obstructed, left at one inch and right at three-quarters of an inch. Ureteral dilator was used on both sides, followed by the injection of liquid alboline. Repetitions of the above measures on October 30, and November 6, and all attempts at catheterization were blocked in each ureter at each of these times. Shadows also appeared in the line of the ureters on both sides.

Following the essays of November 9 the patient felt ureteral colic of several hours' duration and finally sudden relief, as though something had passed into the bladder from the right ureter. Following this there was more than usual bladder irritation, until he felt something pass from the urethra included in a blood clot. This was inadvertently thrown out by the nurse. But the indication that the stone had passed from the rignt side was confirmed by the easy passing, without obstruction, of a ureteral catheter, November 14, to the kidney pelvis on the right side and the absence of the *x*-ray shadow on that side thereafter. No colic recurred after this. The patient felt such relief that he did not wait the clearing up of the question regarding the other ureter, but went home under the promise to return, in case it troubled him further. Letters from him received during the next several years indicated his continued relief from colics and urinary irritation and his enduring health.

Case VII.—Ureteral stricture and stone; recovery twice after cystoscopic measures. I. R—r, aged thirty-six years, married; Hebrew; January 26, 1911. History of ureteral colics last ten months, accompanied by bloody urine. Previous to that patient had "lame" back for a year. Urine clear, but blood cells microscopically. Urethra tight and hypersensitive to instruments.

Cystoscopy, February 4, 1911, showed a tight stricture at the lower end of the ureter; successive sizes of ureteral bougies, 4 to 7 used. February 15, repeated. Much relief from pain and frequency in urination and other evidences of irritation. No more trouble for two years, when he returned (April 10, 1913), complaining of pain in the region of the left ureter, severe attack having begun at 3.00 o'clock on the previous morning. The patient was sent to St. John's Hospital, where on the same afternoon, the metal ureteral dilator was used, stretching the left orifice vigorously. Within two hours afterward the patient passed a small stone. Complete relief came coincidently.

Case VIII.—Prodromal symptoms twelve years; existing attack nine months (continuous pain); immediate cystoscopic removal; permanent recovery. Dr. W. L. G—d, aged sixty years, physician, Saulsbury, Tenn. Was referred October 29, 1908, by Drs. Holder and Crisler, of Memphis. First reno-ureteral colic twelve years ago; occasional attacks since. Present attack began nine months ago and pain has been continuous since. Often the pain in the lower left ureter was so severe as to require the use of morphin. Cystoscopy showed a small black plug filling the left ureteral orifice. It was exhibited to several physicians and assistants before any measures were undertaken. Then with operating cystoscope in place, an alligator forceps was inserted into the orifice and opened, stretching it widely. Immediately there was a spurt of pus and urine from the orifice, including with it the black plug, which proved to be a dark-colored uric acid stone with several small spiculæ

that evidently had become fixed in the ureteral walls and therefore had been prevented from escaping previously. The patient at once remarked, "That is the first time I have been free from that pain in nine months." The stone was, of course, easily removed from the bladder; and the patient was at once well and has had no recurrence of the trouble.

Case IX.—Symptoms eight months; cystoscopic measures; recovery in five days. R. B. W—y, aged thirty years, American. March 23, 1913. History of recurrent renal colics for eight to ten months; some attacks exceedingly severe. Cystoscopy and *x*-ray showed obstruction in the left ureter low down (about two inches above the orifice), and also on the right side about the same distance, both shadows apparently in contact with the catheters. Argyrol solution was injected in connection with the catheter manipulations, and the patient left the city for a few days. Within a week he passed a large sized ureteral stone, relief following and lasting to the present time. He has not returned since.

Case X.—Ureteral colic; relief through cystoscopic measures. Recurrence a year later; cystoscopic manipulations and escape of stone through abnormal opening in ureteral wall; recovery. T. J. S—r, aged forty-three years; merchant, southern Illinois. On February 5, 1903, was suddenly stricken with a severe colicky pain in the left lumbar region, running downward along the course of the ureter into the testis. Morphin in half-grain doses gave only partial relief. On February 9, cystoscopy and ureteral catheterization were followed by forcible injections of an antiseptic solution into the left ureter. On the following night four little pieces of stone were passed voluntarily by the patient and caught in a gauze strainer; relief from pain was coincident.

Nearly a year later (December, 1903) he had a recurrence of the colic but did not consult me for two months,

during which time there was a persistence of pain. March 1 there was obstruction to the passage of the catheter in the left ureter at about 2½ inches above the outlet. Injection of argyrol solution, repeated two days later; but this time it was noted that the obstruction was an inch lower than at the previous catheterization. The metal dilator was then used, stretching the orifice while the instrument was being withdrawn. It was done under direct observation and occasioned nothing of moment at the time. Although the patient was instructed to use a strainer in all subsequent urinations, he failed to do this in some that were incident to the movement of the bowels. But meantime he noted relief from the colics and pain, and when the next cystoscopy was done it was noticed that two openings existed in the line of the left ureter, instead of the normal one. The extra one was located one-half inch external to the natural left orifice. A forceps or dilator, passed into the normal opening, emerged through the anomalous one, showing the communication with the ureteral channel. But on guiding it past this opening, the catheter ascended without obstruction to the renal pelvis, showing the clearing of the channel of all obstructing factors. The pain was gone and did not recur.

The conclusion was obvious. The stone had descended into the intramural portion of the ureter where it had ulcerated its way through the wall into the bladder, whence it passed out in urination.

No bad after-effects were observed as resulting from the unusual opening through the ureteral wall.

Case XI.—Renal colics of sixteen years duration and extreme severity; relieved by intrauretic manipulations. A. C. W—e, aged fifty years; lawyer, Jamestown, N. Y. First conference, Sept. 23, 1903. The history consisted of a recital of greatest suffering and oft-repeated, the attacks of ureteral colic occurring while the patient was in the midst of business duties and requiring measures of the most

heroic magnitude for even temporary relief. The patient's physician, Dr. Hazeltine, assured me that he had often given the patient general anesthetic for four or five hours at a time to alleviate the pain.

The ureteral catheter was obstructed at two inches above the orifice on the right side, at the precise location of the pain as described by the patient. It drained urine that contained a definite amount of pus, non-tuberculous. Injections of antiseptic solution were made into the ureter. On two successive occasions, at weekly intervals thereafter, cystoscopy was done, and at each time it was noticed that an abnormal opening existed in the right ureteral wall at a point one-half inch above the normal orifice (similar to the condition observed in Case X). A catheter could be seen passing under this opening in its transit upward along the ureteral channel. Relief was so marked coincidently that we interpreted the situation as relieved, and the abnormal ureteral orifice as the avenue of escape for the stone. Preparations were made for the departure of the patient for home, when he suddenly had a chill, followed by a temperature of 103°, and pain in the right lumbo-ureteral region. This so discouraged the patient that an open operation was insisted on and carried out, notwithstanding that the ureter was then patent to the easy passage of a catheter, as attested in a cystoscopy.

Dr. T. C. Witherspoon did the operating, incising through the rectus muscle, opening and searching both intra- and extra-peritoneally, but failing to find evidence of a calculus. The ureter was found enlarged and indurated from inflammation, which doubtless was the occasion of the exacerbation of the chill and fever that had precipitated the operation.

At any rate, following this time, the catheter ascended the ureter without obstruction, and there was no more suffering from ureteral colic or pain and the patient made a complete and permanent recovery, in contradistinction to the previous sixteen years of agonizing attacks.

Case XII.—Ureteral symptoms four years; colics frequent and severe for two years; prompt relief from cystoscopic measures. Dr. L. T—n, aged thirty-two years, American, Little Rock, Ark., Feb. 18, 1914. Was operated in May, 1912, and seventy-three gall-stones were removed. Attacks of renal colic began in 1910 and have recurred from time to time since, notwithstanding the gall-bladder operation. Attacks have been very severe for the past two years, and have been more frequent latterly. March 6, 1914, cystoscopy, ureteral catheterization and *x*-ray showed a stone just above the crest of the right ilium. Following dilatings and catheter manipulations, liquid albolene was injected into the ureter well above the stone. This was repeated several times, and three weeks from the beginning of the maneuvers the patient passed the calculus, which was recovered and is shown in the accompanying collection of ureteral stones. Complete relief; no recurrence.

References.

1. Leonard. Jour. Amer. Med. Assoc., January 25, 1909.
2. Deaver. Jour. Amer. Med. Assoc., November 12, 1910, p. 1696
3. Moschowitz. Annals of Surgery, December, 1908.
4. Peterkin. International Journal of Surgery, February, 1909.
5. Bransford Lewis. New York Medical Journal, November 16, 1912.
6. Tenney. Boston Medical and Surgical Journal, February 4 1904.
7. Howard Kelly. Jour. Amer. Med. Assoc., March 3, 1900.
8. W. D. Mayo. Surgery, Gynecology, and Obstetrics, June, 1911.
9. Young. American Medicine, August 9, 1902.
10. Kreissl. Chicago Medical Record, March, 1899.
11. Ashcraft. Hahnemannian Monthly, September, 1906.
12. Moschowitz. Medical Record, May 1, 1909.
13. Bryan. Trans. Southern Surgical and Gynecological Association, 1910.
14. Moore. Urological and Cutaneous Review, November 12, 1913, vol. xvii.
15. Perrier. Journal d'urologie, May 15, 1914.
16. Bransford Lewis. Cincinnati Lancet Clinic, March 4, 1905; New York Medical Journal, November 16, 1912.

PANCREATIC CYST, WITH REPORT OF A CASE

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Pancreatic cysts, while quite rare, do not occur so infrequently. We believe that a number of cases have never been recorded and that the histories of others exist in hospital reports, lectures, etc., so that recourse to them is attended with considerable difficulty. The diagnosis of the condition is not easy, consequently a number of cysts have escaped recognition, especially in communities where autopsies are seldom done. Oser was able to collect records of 133 cases and we add 55 to this number.

It has been our good fortune to have had three patients with pancreatic cysts under observation, and strange as it may seem, no two of the cysts represented the same type. It is also noteworthy that we failed in all instances to make a correct diagnosis until an operation was resorted to.

Cysts of the pancreas show three varieties: First, retention cysts. This type of cyst is due to an obstruction to the outflow of pancreatic secretion. The obstruction may be caused by a chronic indurative pancreatitis, neoplasm of the pancreas, pressure from without, an impacted gallstone, or a concretion in the duct of Wirsung. Senn does not accept the retention theory in its entirety, and, as a modification of it, he suggests and backs up, by some very able work, the idea that the hindrance to absorption is more important in the production of a cyst than the actual obstruction to the duct of Wirsung. The development of a cyst from retention in the salivary gland, physiologically

closely akin to the pancreas, makes us think that a retention cyst of the pancreas is an entity. It may be stated, however, that the closure of the duct of Wirsung is not always followed by cyst formation, but this fact may be explained by a patent accessory duct (Santorini). Retention cysts present a variety of sizes, may be single or multiple, may or may not be lined with epithelium, and the cyst contents may contain all, none, or any combination of the pancreatic ferments. The cyst wall is made up of very dense fibrous tissue in which is often imbedded pancreatic tissue. Second, proliferative cysts. This type of cyst represents a condition quite similar to a multilocular cyst of the ovary. Proliferative cysts may be caused by a degenerative process similar to that found in the breast, or they may be due to a proliferation of the epithelial tissue of the gland. Like the retention cysts they show many sizes, are lined by columnar epithelium one or many layers thick, and the cyst contents may contain any combination of the pancreatic ferments. Proliferative cysts often become malignant, and metastases are found in the liver, bone and elsewhere. Third, apoplectic or pseudocysts. This type of cyst results from an injury caused by some external violence or from an acute hemorrhagic pancreatitis. Pseudocysts are attached to the pancreas and are found most often in the lesser peritoneal cavity. The cyst wall consists of dense fibroelastic tissue and is usually free from pancreatic tissue, except in the region where the tumor joins on to the pancreas, and here we may or may not find small areas of gland parenchyma. If the laceration of the pancreas at the time of the injury is great, some of the ferments may escape and as a result a pseudo cyst may contain all of the pancreatic ferments, but such an occurrence is unusual. The absence of ferments in a pseudo cyst is more often the case than the presence of them.

The diagnostic importance of the pancreatic ferments in the contents of the cyst has brought forth considerable discussion pro and con. Oser states "that the presence of

trypsin is sufficient to warrant the diagnosis of a pancreatic cyst." While Opie asserts "that the presence of one or more ferments resembling those of the pancreas were formerly believed to give sufficient proof that the cyst had its origin in the pancreas. Not infrequently one, or perhaps all, of these enzymes are absent in the contents of a pancreatic cyst. Whereas, fat splitting, diastatic or proteolytic ferments are found in the fluids not derived from the pancreas." In two of our cases the ferments were looked for—in one, a large proliferative cyst, all three were present; and in another, an apoplectic cyst, none were found.

The presence of a pancreatic parenchyma in a cyst wall is positive evidence of pancreatic cyst, but the converse of this statement does not necessarily hold true. The most important aids in the diagnosis of a pancreatic cyst are: the location and attachment of the cyst, the presence of pancreatic ferments in the cyst contents, and the occurrence of pancreatic tissue in the cyst wall.

"The symptomatology varies according to the site, causation, and rate of growth of cyst. Often there is no definite manifestation before the appearance of the tumor, and later the symptoms are due to the presence of the cyst. In cases due to chronic pancreatitis there will have been dyspepsia, loss of weight, and epigastric pain extending over a long period of time. According to Mr. Mayo Robson, 'bulky, pale actions, with undigested muscle fibers and excess of fat will generally be present when the disease is due to pancreatitis.' When there is a hemorrhage into a preformed cyst, the symptoms rapidly become severe and may necessitate active treatment. There is usually a rounded tumor in the left hypochrondrium between the costal cartilages and the midline. As a rule the cyst is movable, often transmits pulsations from the aorta, but is not expansile. The smaller, deep-seated cysts are likely to suggest a solid tumor, while the larger superficial cysts may give the feeling of fluctuation. A large cyst may interfere with the descent

of the diaphragm, and embarrass respiration, may press on the portal vein or inferior vena cava and cause ascites, or on the intestines and give rise to obstruction of the bowel."

The case that we wish to record is that of a pseudo or apoplectic cyst about the size of an orange arising from the lower border of the body of the pancreas and presenting forward under the stomach and colon. As we have said before, a diagnosis in this case was not made until the operation, in fact, the operation was in the nature of an exploration for carcinoma of the stomach.

Case I.—Mr. H., aged fifty-one years; farmer; married.

Complaint: (*a*) Tumor in stomach; (*b*) fulness and burning in the stomach.

Family History. Father died with cancer of the bowels. Sister died with cancer of the womb.

Personal History. Always healthy. Typhoid at twelve years; no complications or sequelæ. Indigestion for past twenty-five years or more. Appetite always good and bowels regular. Gas and nausea after meals, but no vomiting. Habits good.

Present Illness. For the past three or four years indigestion has been growing progressively worse. Burning and fulness in pit of stomach has been very discomforting. Pain in epigastrium coming on several hours after meals, relieved by taking small quantities of food or a glass of water. Pain would often become excruciating on an empty stomach. He has had an occasional vomiting spell, but at no time has there been blood or altered blood in his vomitus. Some gas and nausea after a large meal. Appetite large and he enjoys his meals very much. For the past two or three years has been troubled with diarrhea. Stools natural looking—no blood, never tarry nor clay-colored. Has lost about fifty pounds in weight.

Six or eight weeks ago he noticed for the first time an enlargement about the size of his fist in the upper part of his abdomen. Does not remember having had an injury

Fig. 1.—Radiograph showing indentation on greater curvature from pressure of tumor.

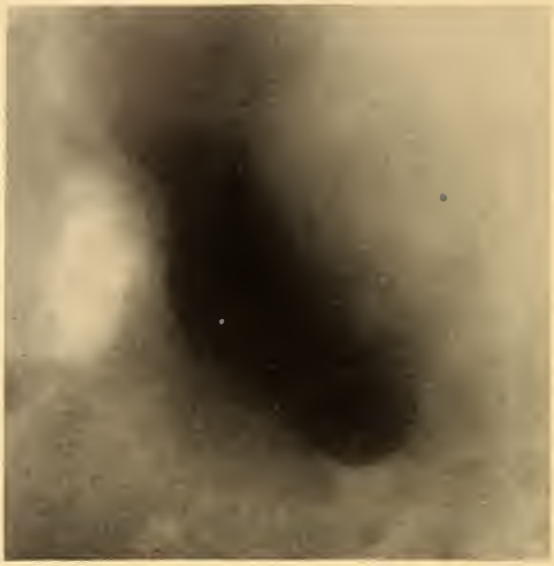

Fig. 2.—Stomach partially empty, indentation not so well marked.

A *B*

Fig. 3.—*A*, outer surface of pancreatic cyst. *B*, cut surface of pancreatic cyst.

to abdomen. About three months ago he suffered two or three days with a severe pain in the upper portion of abdomen. This pain was so severe that it incapacitated him for two or three days.

Physical Examination. Negative except for a mass, movable with respiration, about the size of an orange, located in upper part of abdomen to left of the midline. The mass was smooth, round, and extended from the outer border of the rectus well into the left hypochondrium. No pain elicited on palpating the mass.

Liver and spleen not palpable.

The patient's color was somewhat sallow and he had apparently lost considerable weight. Sclera white and showed no evidence of jaundice.

Blood: Hemoglobin, 85 per cent. White blood cells, 7800. Differential count: 68 per cent., polymorphonuclears, 28 per cent., mononuclears, two transitional, one eosinophile, and one unclassified.

Urine: Negative.

Stool: Negative.

Stomach analysis: Ewald test meal removed at expiration of one hour. 120 c.c. recovered. Digestion poor. No blood. Total acidity per cent., 12. Free HCl acidity per cent., none. Lactic acid, none. Occult blood, none. Microscopic examination, negative. Stomach capacity, two pints. Stomach, outline natural.

X-ray: Serial radiographs of this case revealed a rather small stomach of the "steer-horn" type, the position in the abdominal cavity being higher than is usually seen. On the greater curvature about the junction of the transverse with the vertical portion of the organ was seen a broad, shallow indentation, the margins of which were perfectly smooth. This indentation was not constant in depth on different plates, at times being almost obliterated, especially as the stomach tended to empty itself. No other noteworthy points were detected. (Dr. Talley.)

To sum up the history, we have a man of fifty years, strong family history of cancer, a sufferer from indigestion for twenty-five years, diarrhea, pain in abdomen and finally a tumor in the region of the stomach.

We advised the man to be explored but gave him an unfavorable prognosis.

July 27, 1914. Under ether anesthesia we opened the upper abdomen by midline incision. To our astonishment the stomach was perfectly natural looking, but between the stomach and colon a mass about the size of a large orange had insinuated itself. This mass was adherent to the colon, the small bowel, the aorta, and the great omentum. It pushed the stomach upward, giving it a slight hour-glass appearance. By blunt dissection and traction on the bowel and omentum in the proper direction, we soon loosened the mass from the adhesion and came to the pedicle. The mass was attached to the lower border of body of the pancreas, just external to the aorta. At one time we thought we had a non-expansile aneurysm, as the tumor was stuck to the aorta by loose adhesions. The pedicle of the cyst was about one inch in diameter. This was severed and the pancreatic area from which the tumor was removed covered in. Liver normal, pancreas slightly indurated.

His convalescence, except for the first two or three days during which time he had excessive nausea and vomiting, was satisfactory. He left the hospital August 15, nineteen days after operation, in good shape.

Pathological Report: Tumor, about size of orange, smooth in contour, slightly oval in shape, with numerous fibre tags attached to the capsule, was brought to the laboratory within a few minutes after its removal. On section the cyst contents was made up of clotted blood in fair state of preservation. The central portion of the cyst consisted of fresh blood clot, while the peripheral portion was a clot of some standing and was adherent to the cyst wall. The cyst wall was about 1 mm. in thickness, tough and elastic. Microscopi-

cally it was made up of dense fibroelastic tissue. No evidence of epithelium or gland parenchyma. At the junction of the cyst wall and the blood clot was a new form of scar tissue, which gave the appearance of a clot undergoing organization. The cyst content contained none of the pancreatic ferments.

In the absence of pancreatic ferments in the cyst contents and of pancreatic parenchyma in the cyst wall, we believe that the cyst represents a pseudo cyst rather than a hemorrhage in a preformed retention cyst.

PASSIVE CONGESTION OF THE LIVER SIMULATING ABDOMINAL TUMOR

By Charles R. Robins, M.D., F.A.C.S.
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The following unusual case seems worthy of report.

Case No. 19,136.—Aged forty-two years, white, female, married twenty-three years, 5 para, 2 miscarriages, last pregnancy seven years ago, born at seven months, lived three months. She entered the hospital in a highly nervous and hysterical condition. She complained of her right side and said that she had not been able to lie on it for five months without its beginning to thump. She had been troubled with her right side for about ten years and it appeared to have been getting worse right along. Pain and tenderness were marked. She said she had secured temporary relief at times from the use of fly blister and painting with iodine. Once in a while she had suffered with pains in the side of her head which had been pronounced tic douloureux. Six weeks previously she had been taken with a fever during which she had two decided chills and had become jaundiced. The fever and jaundice gradually cleared up until just before entering hospital. She had suffered also from an attack of jaundice about six months previous to this which had lasted about six weeks. Both of these attacks had subsided under treatment with saline purgatives.

Her appetite has not been good since the last attack of fever and jaundice six weeks ago, she has suffered from

nausea, and cannot take solid food or cold drinks. Anything taken in the stomach causes distress and an uncomfortable feeling and she is thirsty all the time. Her abdomen had swelled a great deal but has since gone down. Her menstruation was slightly increased in amount at last period but otherwise normal, no history of leucorrhea. At times urine had been thick, scanty and high-colored but this was relieved by treatment. She had always suffered from constipation. She had at times suffered with a swelling of the feet and had had some respiratory disturbance. A year previously a tumor had been discovered in her upper right abdomen which has continued to be present.

On physical examination no trouble was detected in the lungs, the heart sounds and pulse indicated myocardial degeneration but no murmur or valvular insufficiency was detected. Several blood-pressure readings after treatment had been instituted varied from 85 to 100, systolic. There was no edema and no ascites. The abdomen was very prominent and somewhat tense. In the upper abdomen to the right of the median line and coming apparently from the under surface of the liver was a globular tumor about the size of a grape-fruit which could be easily moved about and which moved with respiration. It was quite tender and tense and gave the sensation of fluid in a tight sac. Owing to the large abdomen physical signs were not distinctly elicited. Attempts to reduce the tumor into the kidney space were unsuccessful, and in making the bimanual examination of the right loin no palpation of the tumor could be made posteriorly. The Wassermann test was negative. Examinations of blood and urine showed no deviation from normal.

Three days after entering hospital patient was taken with a severe pain in lower abdomen and nausea which gradually subsided. Owing to the extremely unsatisfactory condition of the patient's nervous system and to uncertainty of diagnosis the patient was kept in the hospital

for sixteen days before operation for purposes of observation and treatment. At that time repeated examinations enabled us to apparently exclude the kidney, the tumor remained nearly the same size but was slightly diminished and was not so tender as it had been. It was still fairly movable. On account of the previous chills, fever and jaundice and the physical findings a tentative diagnosis of distended gall-bladder was made and the abdomen opened by a right rectus incision. The palpable tumor was found to be the right lobe of the liver which was enlarged and congested and displaced downward with its lower portion projecting into the abdomen, the edge of the liver being rounded off by the swelling. The color was quite dark and presented a slight nutmeg appearance. The gall-bladder and ducts were examined and found to be normal. The appendix presented well-marked evidences of chronic inflammation and was removed. A small section of the liver was removed for microscopic examination and sent to Dr. A. C. Broders at the Mayo Clinic who reported as follows: Marked fatty degeneration with some cirrhosis and round-cell infiltration.

The unusual and unexpected findings in this case led to a search of available literature. Only one reference to such a condition was found, but this one presented many points in common. In case No. 93, in Cabot's *Differential Diagnosis*, the following is noted: An Italian laborer, forty years of age, had had rheumatism and developed valvular disease of heart. For six weeks previous to admission he had had gnawing pain in epigastrium and right hypochondrium, gradually getting worse and sometimes disturbing his sleep. Physical findings of chest, etc., are described and then "in the upper right abdominal quadrant is a mass easily felt bimanually, descending over an inch on full inspiration with a rounded edge and a semi-fluctuant substance. Whether or not the liver is continuous with the mass described above cannot be certainly determined. The liver edge is sharp

on the left of the median line, but cannot be felt distinctly on the right. The spleen is palpable, abdomen otherwise negative; likewise the rest of the body. Urine, 40 oz.; specific gravity, 1021. No albumin, pus, blood, or casts. Blood normal." After an analysis of the case Dr. Cabot states: "Is it possible that simple passive congestion due to the cardiac lesion might produce so soft an enlargement of the liver? Against this is the absence of much stasis in the lungs, legs, or abdominal cavities, and the fact that the questionable mass cannot with certainty be connected with the liver edge palpable to the left of the median line. A surgical consultant considered the symptoms due to a tumor of the gall-bladder or of the kidney. On the whole, there seems to be enough doubt upon this point to justify exploratory laparotomy. Laparotomy showed the kidneys and gall-bladder to be normal. A large, dark, congested liver was the only finding. This case seems to be of unusual interest, since it shows that passive congestion of the liver is one of the items which must be seriously considered in a diagnosis of diseases involving the right upper quadrant."

In discussing venous congestion of the liver, D. W. Hale White says: "The enlargement of the liver is firm and uniform, its edge is hard and uniform, its surface smooth. The enlarged organ may reach to the umbilicus, and as the abdominal muscles are often weak in these cases, especially in women, and the liver is very heavy from the extra amount of blood in it, the organ is often a little dropped. Pain and tenderness over the liver are very common; they are due in some cases to stretching of the hepatic capsule, in others to local patches of perihepatitis. The skin over the liver may be tender. In severe cases there is often slight jaundice. Dyspeptic symptoms are frequent."

The subsequent history of the case which I report was very satisfactory. She was treated by prolonged rest in bed, strophanthus and iodides. Under this the enlargement of the liver gradually subsided until eventually it was only

slightly palpable and all tenderness had disappeared. The patient was fitted with a supporting corset and gradually resumed her usual habits and exercise and has remained well to the present time, a period of about nine months.

Syphilis of liver seems to have been thoroughly excluded by absence of history, of clinical findings and negative Wassermann. The pathology of the appendix seems to have been sufficiently pronounced to account for some of the abdominal disturbance. The cardiac condition is the only evident etiological factor definitely associated with the marked changes in the liver. This was doubtless augmented in this case by loss of abdominal tone and hepatoptosis. It is certain that after circulatory equilibrium had been reëstablished by rest and cardiac support the patient has received great comfort from a properly fitted surgical corset and remains well.

A CASE OF CHORIO-EPITHELIOMA MALIGNUM COMPLICATING A TWO MONTHS' PREGNANCY AND A DEGENERATED UTERINE FIBROMA

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Whether chorio-epithelioma malignum is a rare disease or more common than the literature would indicate, as many writers state, I will not attempt to discuss here at length. But we know that less than 500 cases are thus far recorded. Judging from its onset being often sudden and progress to death rapid, the failure of many to carefully study curettings and autopsy specimens and the lack of suspicion of the nature of the disease on the part of the attendant, noted so frequently in the recorded cases, I believe many unrecorded cases have occurred. In none have I found complications reported similar to those of the case here cited nor in such an early pregnancy; nor with so little symptomatology. It has been found complicating fibroids but with severe symptoms, notably hemorrhage. In my case no hemorrhage occurred. Nor has it been found complicating an early pregnancy without symptoms as in the case I here report.

It will be noted that my patient had been pregnant last thirteen years before and had aborted without incident at six weeks, and that no menstrual or pelvic symptoms followed until after pregnancy began in July last, and even then nothing indicated an abnormality other than the fibroid complicating pregnancy.

It may be said, then, that I report this case because of (1) its early discovery; (2) its complicating an early (six weeks) normal pregnancy; (3) it also complicated a degenerated uterine fibroid; (4) it has no symptomatology; (5) it was removed early and perhaps entirely, and (6) that while the growth had passed from the villi into the uterine muscle microscopical study of the uterus and absence of symptoms fail to indicate the existence of metastasis.

The history of the case is as follows: Mrs. F. K., white, aged forty-one years, resident of Wilmington, Del., consulted me September 25, 1914, for the presence of an abdominal tumor that had recently been the seat of severe pain.

She had been married eighteen years and had given birth to two children, now aged fifteen and fourteen years, respectively.

Thirteen years ago her only other pregnancy terminated in an abortion at about the sixth week. Her menstruation had always been regular until May 22, when it was delayed a few days but continued the usual three days. In June it was a little more delayed but lasted the usual three days. July 22 to 25, the last period, was six days late. Her periods were always painless and moderate in amount.

No vesical symptoms, except frequent urination, had supervened. She had not suffered from constipation, but about August 25 she had vomiting and purging for two days, followed by constipation and purging alternately to date. The vomiting had suggested "morning sickness" though it frequently occurred in the evening. The vomiting and amenorrhea had caused a suspicion of pregnancy but the pain in the tumor had alarmed her. A surgeon in Wilmington had diagnosed a tumor and possible pregnancy, and advised removal of the tumor.

Examination. The patient is a well-nourished and plump woman. No breast changes of pregnancy are detected. In the abdomen a mass is felt extending from the pubes to umbilicus and from the midline to the extreme left side of

the cavity. It is hard but tender and somewhat movable. The cervix is softened and another mass, movable and dense, much smaller than the one previously described, is found to the right. It is found firmly attached to the cervix. It is thought to be the uterine body, pregnant and displaced upward and to the right by the left tumor, or a pregnant right horn of a bicornate uterus and a degenerating fibroid in the left one.

Neither appendage is recognized. Operation was recommended and performed next day.

The body of the uterus and a necrobiotic uterine fibroid (the left mass) and the vermiform appendix were removed. No adhesions were encountered and the normal appendages were not disturbed. The specimen was opened, the tumor showing the changes mentioned and the uterine body containing a fetus of about six weeks' development. The uterine cavity was not laid open sufficiently to expose more than the fetal sac and its contained fetus. The uterine body was but a projection from the tumor and myomectomy was discarded. After the operation was finished a hospital interne split the uterine body widely and saw the chorionic changes before sending the specimen to the laboratory.

There Dr. J. B. Briggs, professor of pathology, after many sections, reported it as chorio-epithelioma malignum that was present in the removed tissues only in the chorion and attached portion of the uterine wall.

Dr. Briggs made the following report: Patient's name, Mrs. K.

Tissue received: September 26, 1914, and October 14, 1914.

Clinical diagnosis, chorio-epithelioma malignum.

Remarks. Many sections of the fundus, cornua, body, and neck of uterus were made. No invasion of syncytioma was found in these regions. It was in one section only, which was made between what appeared, owing to the dis-

tortion due to the fibroma, to be the apex of the fundus and the left cornu that any trace of invasion of maternal tissue was discovered. In this region alone definite syncytiomal growth, showing particularly the characteristics of Langhans' layer, intruded upon the maternal tissue.

No peritoneal invasion was discoverable nor were any matastases found in neighboring organs.

October 14, the cervix was removed per vaginam and Dr. Briggs reported it free of the disease. The appendages were not removed. The patient was examined December 14, 1914, and bore no evidence of the presence of the chorio-epithelioma.

Definition of Chorio-epithelioma Malignum. Chorio-epithelioma malignum is a form of malignant neoplasm that occurs in both sexes, though much more frequent in females than in males; that it usually arises from pregnancy, often from leaving behind fragments of chorionic tissue, normal or abnormal, which have been retained from pregnancy that neither went to full term or terminated in miscarriage or abortion, and particularly if degeneration of the placenta or chorion into a hydatid mole had occurred; that it may occur in women before (Pick's case[16]) or long after (Devitzky's case[6]) the procreative zone of the life of woman; that it may be found in men in organs most subject to teratomatous formation (Schlagenhaufer's 2 cases[20] and Emanuel's cases[8]) as the testicle and mediastinum; and that it may also be found in the testicle independent of teratomata (von Hansemann[11] and Emanuel). In man it is nearly always of teratomatous origin, though cases have been carefully studied and reported as being entirely free of teratoma.

History. To quote from Caturani's[2] valuable monograph on chorio-epithelioma and other papers on the subject, Netzel in 1872, Mayer in 1876, Chiari in 1878, Hofmeyer in 1885, and Mayer in 1888 observed and reported a disease similar to chorio-epithelioma. But its nature was not clearly understood until Sänger[17] in his paper before the Leipzig

Obstetrical Society, July 16, 1888, described a tumor differing absolutely from any known tumor and emphasized its peculiar relation to pregnancy. He stated that the microscopic examination showed it to be a very hemorrhagic tumor made up of cells similar to those found in the decidua and was a malignant metastasising deciduoma.

The case he more fully described before the German Gynecological Society in 1892.[18] In 1893[19] he made it the nucleus of an exhaustive monograph published in the *Archiv für Gynäkologie.* In 1889 Pfeiffer,[15] a pupil of Chiari, ignorant of the work of Sänger, described a similar case, calling it deciduoma malignum, and stated that Chiari[3] now regarded the three cases he had reported two years before as carcinoma of the uterus following the puerperium as identical with the one Pfeiffer was reporting. Gottschalk,[10] in 1894, thought it of fetal origin and the tumor sarcoma of chorionic villi.

J. Whitridge Williams,[23] in 1895, in reporting very fully a case of deciduoma malignum, called attention to the emphatic presence of chorionic structures in his specimen and of its differing in this respect from that of Sänger. Appelstedt and Aschoff,[1] in 1896, still further emphasized the fact that chorionic tissue was the essential feature of such tumors, and two years later Marchand[14] clearly demonstrated that all such tumors were from the layer of Langhans and contained syncytial tissue, and therefore chorionic and not decidual in origin. He called the new growth, "chorio-epithelioma," a name that has been universally adopted. In some instances the new growth has been found only in the chorion and therefore not considered malignant. This has led many to add to the name the qualifying word "malignum" which, strictly speaking, is superfluous.

As I have elsewhere stated, about 500 cases have been reported.

Structural Characteristics of Chorio-epithelioma. The tumor is usually dark gray or nearly black in color and if

attached to a surface such as the uterine wall or vaginal wall may be rounded, much like a polyp. In the vaginal wall the masses of this form of tumor are distinctly nodular.

In metastases in the lung, liver, kidney, spinal cord or ovary it may assume various shapes though it usually is nodular. At all events it is soft and has the appearance of having been subjected to some form of traumatism, and blood clot about it is always noted. This may be due to the veins being the sole means of transportation of the masses from the original tumor. It essentially contains quite well-arranged cells from the syncytium and Langhans' layer. In many, villi are distinctly seen, though to a much less extent in the metastases and, I believe, never in the male.

The primary tumor if in the uterus may attain such size as to be mistaken for a uterus pregnant seven months, but is more apt to be small. In fact the uterine condition—primary focus—may be entirely overshadowed by vaginal metastases, which have attained a much greater size.

Metastases. By no means is there a thorough agreement among pathologists regarding the danger and time of metastasis. Many believe that fragments of the villi are carried through the blood channels to other parts even in normal conditions and in many cases that are believed to be quite remote from pregnancy the first and only evidence of the disease is in metastases, found principally in the lungs. In such the primary focus may not be easily located if various organs are involved. Certainly if the uterus is at the time free of the disease it can not be regarded as the primary focus. Moreover in a few cases, fatal in result, the growth has been recognized in the chorion with metastases in the vagina or the lungs and abdominal viscera, and the uterus not invaded.

While the new growth usually begins in the uterine gestation contents and invades the uterine wall, and later metastases, we have just referred to the evident passage through the blood channels of fragmentary villi that find lodgement

and, perhaps after a long period of quiescence, take on malignant properties.

Varieties of Chorio-epithelioma. Besides the variety the identity of which was definitely established by Marchand, in 1898, and proclaimed to be absolutely a result of pregnancy, two cases were reported by Schlagenhaufer, in 1902, of malignant tumors of the testicle in which he had found chorio-epitheliomatous elements, viz., syncytial masses and groups of Langhans' cells. In 1904 Emanuel collated 14 such cases and described one of his. The close resemblance of the chorio-epithelioma by the presence in some of them of cystic bodies, which from both the microscopical and naked-eye appearance resemble the hydatid mole vesicles. Schlagenhaufer believed, and his opinion is generally accepted, that the peculiar fetal ectodermic tissues found in these testicular tumors were derivatives of embryonic relics belonging to the stage of development in which chorionic tissue is so abundantly produced. Similar tumors have since been found in various parts of the body in which teratomata abound. But, further, another variety was found in man—a pure chorio-epithelioma having no usual characteristics of dermoids or teratoma, but which consisted solely of blood clot, fibrin, and the essential plasmodial and cellular elements. It was not to be distinguished from the chorio-epithelioma found in the uterus and vagina. Von Hansemann's case, reported in 1904, was of a tumor of the testicle with metastasis to the abdominal viscera and was described as follows: "All the growth consisted of fibrin and blood clot with much leukocytic infiltration; running through the blood clots are grayish strands of tissue which consist of Langhans' cells and syncytium. "Emanuel recorded a similar case. Eden[7] considers them also of teratomic origin. Eden also believes that chorio-epithelioma of teratomic origin can also occur in the female when pregnancy cannot possibly enter into the etiology. He quotes two cases to substantiate this view. The first case—that of Pick—

was that of a girl of eight and a half years in whom menstruation had never occurred and from whom was removed an ovarian tumor consisting mainly of typical teratomatous structures but which in parts showed typical chorio-epitheliomatous elements, some of the sections exhibited being indistinguishable from Marchand's tumor. He states that "this case of Pick obviously reproduces all the essential features of the testicular growth recorded by Schlagenhaufer and others, and may, nay, must, be explained upon the same hypothesis."

Although the age of Pick's patient does not positively preclude pregnancy, the general teratomatous characters of the tumor removes all objection to be raised on that score. Devitzky has a very remarkable case that also is used quite reasonably to support this theory. It was of a woman seventy-five years of age that was admitted to the gynecological clinic of the University of Moscow (Prof. Michael Nikiforoff), October 1, 1903. "She had had irregular uterine hemorrhage for two years; dyspnea, cough, bloody expectoration and painful micturition of recent onset. The menses ended at the age of fifty-five years and had always been regular. She presented the anatomical signs of virginity and firmly denied she had ever been pregnant." While in the clinic micturition was painful and frequent and the urine contained 5 per cent. of albumin; the bloody expectoration was profuse, the abdomin was distended (circumference, 45 inches) although general emaciation was notable. A uterine tumor was diagnosed as an interstitial fibroid and curettage was done October 8 and the sound entered 15 cm.; cardiac failure, general edema, partial anuria; death October 19. Microscopic examination of curettings showed hypertrophic glandular endometritis but no trace of malignancy.

Autopsy, October 20. Findings: (1) Old-standing pleuritic adhesions with numerous rounded masses of new growth distributed through both lungs and similar nodules in the

bronchial glands; (2) enlargement of uterus from very large number of hard nodular fibroid tumors from mucosa to serosa, the uterine cavity empty and walls smooth; (3) in posterior wall of the bladder was a dark red, rounded growth, a little elevated above the general mucosal surface, irregular and ulcerated upon the surface, with incrustations of salts; (4) in the wall of the sigmoid flexure was found a small, dark red nodule. The tubes, ovaries, vagina, external genitals and abdominal viscera were generally free from disease.

Thorough microscopic study of the nodules in bladder wall, sigmoid and lungs showed they all contained the same minute structure: (1) Blood clot, fibrin, and debris; (2) masses of syncytium; (3) collections of round and polygonal cells resembling cells of Langhans; (4) numerous large "giant cells" and cells of intermediate types. All the well known and characteristic elements of the chorio-epithelioma were present. The syncytial and cellular masses also showed the marked tendency to invade bloodvessels and even to form thrombi in them, always regarded as one of the typical features of chorio-epithelioma.

Eden says: "Here are two authentic cases and at the extremes of life, with the primary growth in one in the ovary and in the other in the bladder, and in both the uterus, vagina, tubes and external genitals were not involved." He regards these as teratomatous cases the same as occurs in the male.

But Devitzky's case differs from all the others by having its primary site in a structure that is not regarded as one in which dermoids or teratoma are found. Eden says he finds no record of a dermoid in the bladder. Devitzky, rejecting the teratomatous theory as to origin of the tumor in his case, thinks it arose from a Wolffian duct. Eden thinks it may have arisen from the vesical mucosa by metaplasia.

Thus it is shown chorio-epithelioma exists in at least two forms: one arising from pregnancy, and the other occurring in either sex, is of teratomatous origin.

Causes. Some changes in the chorion bring about this malignant disease, which follows molar pregnancy in from 36 to 41 per cent. of cases; normal gestation, 22 to 28 per cent.; abortion, 31 to 33 per cent., and from 2 to 4 per cent. ectopic gestation.

Degree of Malignancy. Schmauch[21] and others have decided: "The presence of plasmodium when not connected with a villus must always be regarded as a sign of malignancy. The assemblage of well-defined cells of the character of those forming the Langhans layer, no matter what size or form, among healthy tissue or true plasmodium is, when found several months after expulsion of the ovum, an unmistakable sign of boundless growth." Teacher[22] says the degree of malignancy is less when villi are present. As villi are not present in the metastases they might be considered exceedingly virulent. And yet all are agreed that removal of a primary growth in the uterus generally lessens or abolishes the malignant feature of the metastases, and *vice versa.* Even curettage may remove the primary focus in the uterus, but the literature case records do not appear to support this plan of treatment as the malignancy has not been materially lessened by that plan.

Strangely enough, partial removal of primary uterine foci (Noble) has resulted in cure. Perhaps the degree of malignancy depends on the origin of the primary growth. Findley[9] states that 16 per cent. of hydatid moles are malignant, while others think the full-term pregnancy is more potent in that respect. No doubt the malignancy is of a high order, yet less so than carcinoma of the cervix or even of the body of the uterus. As a rule, however, the disease is not recognized early, as apparently it is capable of very rapid early advancement. Perhaps normal pregnancy delays the symptoms of hemorrhage, one of the most constant early symptoms, and as a result the disease is beyond eradication before discovered. E. P. Davis[5] says there are but two known cases of spontaneous cure.

Time of Development Relative to Pregnancy. Various authors have attempted to glean data on this feature in tables of cases. In Ladinski's[13] statistics the average is eight weeks after molar pregnancy, seven weeks after abortion, and five weeks after pregnancy at term. That it may occur or be recognized much earlier cannot be doubted. In my case it was incidentally found in a uterus containing a normal fetus at the end of six weeks' gestation. *An contraire,* in Caturani's first case the disease lay dormant five years after a mole was passed.

Symptoms. The chief symptom of chorio-epithelioma of the uterus is hemorrhage, which is apt to be repeated, usually a few weeks after a full-term labor, an abortion, or the removal from the uterus of a molar pregnancy. There may be fragments of the growth passed. The uterus may contain a pregnancy that is apparently progressing normally, and nodules—soft, dark gray in color, and later bleeding freely, may be noted in the vagina. Metastases to lungs, liver, kidney, brain, or cord will give symptoms referable to those respective organs. Usually pulmonary metastases have been mistaken for pneumonia. A primary focus in an ovary or the bladder may give symptoms referable to those organs and even the cystoscope may assist in discovering and noting the characteristics of the new growth in the bladder.

Diagnosis. As chorio-epithelioma is so constantly associated with pregnancy, either coincidently or following, and its chief symptom, hemorrhage, one often associated with some of the most frequent complications of pregnancy, labor at term, and abortion, it is likely not to be considered early in the case. Case records illustrate this fact luminously. The disease is of a nature so serious that uterine hemorrhage of a persistent type occurring a few weeks or months after labor at term, an abortion, or a molar pregnancy should recall it to us. If nodules having characteristics mentioned suddenly appear in the vagina at any time, and especially during pregnancy, or just after one has

terminated in full-term labor, abortion, or the passage of a hydatid mole, and more particularly if symptoms appear that might be attributed to other metastases, then greater suspicion of this disease is proper. Enlargement of the uterus (without reason to suspect pregnancy) rapidly into a doughy and perhaps fixed mass, or enlargement of a too rapid or a too slow speed to conform to a known pregnancy, may also suggest this disease. The microscopical examination of the tissues of chorio-epithelioma is sufficiently characteristic and constant as to leave little doubt.

Prognosis. What is the fate of the victims of this disease. Kroemer[12] has shown but two cases have recovered without operation. Childress[4] has from a collection of 455 cases found that 68 per cent. recovered after early radical operation after molar pregnancy; 58 per cent. after abortions and full-term deliveries; and 33 per cent. in ectopic gestation cases. Teacher collected 188 cases in which radical operation was performed 99 times with 63.3 per cent. recoveries. Childress found 11 per cent. of recurrences in from six months to two years, none of the series having been reported after two years.

One studying the case histories recorded is impressed by the many delayed operations and subsequent and fatal recurrences. Improvement lies in greater importance being lent to this disease and earlier operations being performed. Clinical evidence alone will usually be our guide, the microscope affording confirmation.

Treatment. The treatment should consist of early operation. As this is a disease that migrates through the large channels—bloodvessels—metastases may be expected to occur early and particularly if curettage is done. I believe strong suspicion of the existence of this disease in the uterus should be a sufficient indication for panhysterectomy. It is believed that we should never assume the uterus is free of the disease if it has been found in the chorion.

The disease is so fatal and the chances of extirpation by

early operation so good that I believe greater benefit will arise from removal of the uterus without preliminary curettage and possibly removing a small percentage of non-cancerous uteri than by increasing danger directly incident to the curette.

BIBLIOGRAPHY.

1. Aschoff. Arch. f. Gynäk., 1896, i, 511.
2. Caturani, M. Amer. Jour. Obstet., 1911, lxiii, 614.
3. Chiari. Wien. med. Jahrbuch., 1878, p. 363–368.
4. Childress, M. Jour. Iowa Med. Soc., 1914, p. 855.
5. Davis, E. P. Surg., Gyn., and Obst., Chicago, 1908, vi, 473
6. Devitzky. Meditsinskoe' Obozrenie', 1904, lxi, No. 5, p. 353 (from the anatomo-patholog. Instit. of Moscow).
7. Eden, Thos. W. Jour. Obst. and Gyn. British Empire, 1907, xii, 424.
8. Emanuel. Zentralbl. f. Gynäk., 1904, p. 143.
9. Findley, Palmer. Gynecological Diagnosis, Philadelphia, 1903, p. 151.
10. Gottschalk. Arch. f. Gynäk., 1894, xlvi, 1.
11. von Hansemann. Zentralbl. f. Gynäk., 1904.
12. Kroemer. Deutsch. med. Woch., 1907, No. 31.
13. Ladinski. Amer. Jour. Obst., 1902, xiv, 465.
14. Marchand. Zeitschr. f. Geb. u. Gynäk., 1898, xxxix, 173.
15. Pfeiffer. Prag. med. Woch., 1890, p. 317, No. 26.
16. Pick. Berl. klin. Woch., 1904, No. 7.
17. Sänger. Centralbl. f. Gyn., 1889, p. 132.
18. Sänger. Verh. d. deutsch. Ges. f. Gyn., 1892, iv, 333
19. Sänger. Arch. Gyn., 1893, xlix, 89–149.
20. Schlagenhaufer. Quoted by Eden (loc cit.).
21. Schmauch. Surg., Gyn., and Obst., 1907, xv, 259.
22. Teacher. Jour. Obst. and Gyn. British Empire, 1903, iv, 145.
23. Williams, J. W. Trans. Amer. Gyn. Soc., 1895, xx, 348.

CYSTS OF THE MESENTERY, WITH A REPORT OF THREE CASES

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The points of particular interest centering around cysts of the mesentery are their rarity, their genesis, their disputed classification, the infrequency with which they are diagnosed, and their role in causing intestinal obstruction.

Lawson Tait is said never to have seen a mesenteric cyst, and Spencer Wells only two.[1] Dr. L. L. McArthur, of Chicago, stated in 1912, that he had never seen a chylous cyst of the mesentery, and quotes the late A. H. Ferguson as having had the same experience.[2] In 1912, Friend,[3] of Chicago, collected 52 cases of the chylous type of these cysts; and in 1913, A. L. Benedict,[4] of Buffalo, supplemented Friend's list, bringing the total up to 96. The chylous type embraces approximately one-half of the mesenteric cysts reported, so that about 200 in all have now been recorded.

Information as to the origin of these cysts is based largely upon a study of the cyst contents and of the cyst wall, and classifications have been based upon these findings.

An effort to revise their classification in conformity with their origin, and to put them all, except hydatid and malignant cysts, under the head of embryonic growths, was made by Dowd in 1900. He found[5] in the mesentery of

[1] Douglas, Surgical Diseases of the Abdomen, p. 731.
[2] Surg., Gyn., and Obst., July, 1912,
[3] Ibid.
[4] Ibid., June, 1913.
[5] Ann. Surg., Philadelphia, vol. xxxii.

the transverse colon a cyst which corresponded with ovarian cystadenomata in the very material respect of containing pseudomucin and in the further fact that certain secondary cysts growing from its inner wall were lined with epithelial cells. He also found evidence of degenerated epithelium lining parts of the cyst wall proper. Arguing from these findings, he concluded that the cyst originated in a portion of the ovary or germinal epithelium, separated from the rest of the organ in the early process of development. He showed, further, that it was at least possible, and to his mind probable, that those cysts which had hitherto been classed as chylous, serous, sanguineous, and lymphatic were in reality all embryonic.

However, those changes in the cyst contents which are developed by time, and particularly those changes in the cyst wall which are induced by pressure, inflammation, etc., so tend to invalidate the evidence that at one time may have been present in the average mesenteric cyst as to render Dowd's theory at least incapable of anything like uniform proof. Not a few cysts have been found whose origin could be traced with reasonable certainty to a sequestration from the intestine, or from the ovary or to relics of other structures like the omphalomesenteric duct.

The fact, however, that the usual mesenteric cyst is not lined with epithelium at the time of its examination must not be taken as evidence that such a lining did not exist during the early development of the cyst. The gradual or sudden accumulation of fluid within its cavity may have destroyed the epithelial structure; inflammation may have accomplished the same change. Such, indeed, we know is the history of parovarian cysts; that is, when small they are lined with epithelium, but as they increase in size this epithelium is at first modified and later destroyed.

R. T. Miller[1] reviews at length the theories as to the origin

[1] Bull. Johns Hopkins Hosp., October, 1913, xxiv.

of mesenteric cysts, and records a most interesting case of such a cyst which indisputably represents an intestinal sequestration. He quotes the work of Lewis and Thyng, who, in 1908, first observed the actual process of sequestration in the developing gut, and whose findings prove that mesenteric cysts undoubtedly may originate as intestinal diverticula. Furthermore, there is a very general belief that a certain additional number have their origin in the omphalomesenteric duct.

The following illustrates the progressive changes which have been made in the classification of mesenteric cysts since a large enough number have been studied to warrant classification. In 1897 Moynihan[1] classified them as:

1. Serous.
2. Chylous.
3. Hydatid.
4. Blood.
5. Dermoid.
6. Cystic malignant disease.

Only the dermoids suggest an embryonic origin. In 1900, Dowd[2] proposed:

1. Embryonic.
2. Hydatid.
3. Cystic malignant disease.

Here the embryonic origin of nearly all these cysts is implied. In 1907 Niosi subdivided the embronic cysts as follows:

1. Cysts of intestinal origin:
   (*a*) By sequestration from the bowel during development.
   (*b*) From Meckel's diverticulum.
2. Dermoids.
3. Cysts arising from retroperitoneal organs (germinal epithelium, ovary, Wolffian body, Müllerian duct).

[1] Ann. Surg., Philadelphia, vol. xxvi, p. 1. [2] Ibid., vol. xxxii.

So that whether or not one agrees with the view that most mesenteric cysts are embryonic, there is evident a growing tendency to believe that a great many do so originate.

It should be said that mesenteric cysts have been variously supposed to originate from dilated or ruptured lymph vessels, from degenerating lymph glands, and from the receptaculum chyli; and such sources can at least not be disproved. There are those (Braquehaye, Moynihan, Porter, and others) who do not at all agree that practically all mesenteric cysts are embryonic and who adhere to those classifications of which Moynihan's is a type.

It is to be regretted that in the cases outlined below there appeared findings of no particular significance as bearing on the subject of genesis. Sections taken from various parts of the cyst walls failed to reveal epithelial lining or other suggestive structure.

It is probable that a diagnosis of a mesenteric cyst is seldom, if ever, made prior to operation or autopsy. It would seem, however, that the time has come when such a diagnosis ought to be made in typical instances with reasonable certainty—largely because during the last decade enough cases have found their way into the literature that the surgeon will at least be cognizant of the fact that such a tumor may be in the abdomen and that it should not be overlooked.

Of course, a diagnosis presumes that the cyst has reached some size. If its location be in the mesentery of the small intestine (and not confined to the root of the mesentery) the outstanding feature will be its extreme mobility. Theoretically, and sometimes actually, it can be carried from one side of the abdomen to the other, and can be made to perform similar excursions in a vertical direction. The tumor may at times be rotated on its own axis. Given such a movable tumor, centrally situated, fluctuating, surrounded by resonance, not connected with the ovary, liver, kidney, or spleen, and the diagnosis is practically certain. If there

can be added to this information a band of resonance crossing the tumor and a history of recurring attacks of pain and vomiting a positive diagnosis is warranted.

Porter[1] says cysts of the mesentery more often cause pain than do any other cystic abdominal tumors, and adds that the same is true of vomiting. These symptoms depend usually upon the encroachment of the cyst upon the lumen of the gut. If the encroachment be moderate, colicky pains due to exaggerated peristalsis proximal to the tumor are apt to occur; if the encroachment be more marked actual obstruction to the fecal current may ensue.

Of prime surgical interest is the possibility of acute intestinal obstruction. Among the types of obstruction, volvulus is prominent. It is possible that in Case I, reported below, recurring attacks of volvulus had covered three years. In a number of reported cases such recurring attacks were probable, so that such a history assumes considerable diagnostic significance. Porter quotes von Blum as having first called attention to this fact. In Porter's case, acute obstruction occurred from strangulation over a band formed by the cyst pedicle. Further, the stretching of the gut over the cyst has amounted to gangrene (Sutherland). Besides the above types of obstruction there are the usual possibilities of such an accident resulting from adhesive bands between the cyst and neighboring viscera, or following peritonitis (and its consequences) from rupture of the cyst.

These cysts have been treated by aspiration, by stitching to the abdominal wall and draining later, by enucleation, and by resection of the affected portion of the gut.

Aspiration is no longer justifiable unless indeed it be practised as a preliminary procedure or for temporary relief when more radical measures would be unsafe. Drainage is not ideal surgery, though published statistics indicate that it is not only safer than resection, but that it more frequently cures the patient than one would suppose. These

[1] Ann. Surg., Philadelphia, vol. xliii.

statistics do not, however, probably represent the relative wisdom of drainage and resection at the present day. Being a simple procedure it is natural that the immediate mortality should be relatively low, but the percentage of patients who are not finally cured must enter into a consideration of the comparative merits of drainage and other more ideal measures. Of course, when the condition of the patient is critical the simpler procedure is the wiser. In my own Case I, drainage would probably have been wiser except for the volvulus which had put in jeopardy the condition of the gut.

Enucleation is the ideal treatment if it can be done safely.

Resection is, next to enucleation, the treatment of choice unless conditions call for the quickest possible operation.

Case I.—Male, aged four years; referred by Drs. Bell and Tribble, Lithonia, Georgia.

Family History. Negative.

Past History. When six or seven months old he had convulsions with some sort of acute abdominal trouble. Convulsions lasted three to six hours, after which the patient gradually recovered from his abdominal symptoms, which were present several days. Every one to six months since the above attack the child has had somewhat similar abdominal seizures, but without convulsions. He always complained of his "stomach hurting," and always vomited. These attacks always came on suddenly, and the severity lasted only one or two hours. Parents do not recall that there was any difficulty about the bowels moving, although they think the abdomen was usually distended during attacks. At the age of two or three years the boy is said to have had typhoid and was in bed one month. This sickness began with vomiting, and throughout the month there was diarrhea. Since the typhoid, the acute abdominal seizures have continued as before. Parents have noticed for two years that the child's abdomen was unusually full above the umbilicus. They cannot recall that the acute

attacks commonly followed a jump or fall. Vomiting and purgation have relieved the situation prior to the present attack.

Present Illness. Four days prior to operation the patient, after jumping from a wagon, was almost immediately seized with abdominal pain and vomiting. This time the pain and vomiting continued, and the family physician, on being called, administered purgatives and enemas without being able to get a bowel movement. These efforts were continued three days when we saw the child. The vomiting had continued meantime without abatement.

Physical Examination. The child was fairly well nourished. Distention was moderate. The temperature was normal, the pulse 120. On account of the constant crying of the child no very satisfactory physical examination could be made. Visible peristalsis in the upper abdomen was marked. Rectal examination was negative.

Diagnosis. The symptoms were those of obstruction without actual strangulation, and a diagnosis of probable intussusception was made.

Operation. The abdomen was opened promptly through the right rectus. Immediately there came into view a yellowish mass in the mesentery of the small intestine (Fig. 1). The cyst had encroached on the gut so as to greatly restrict its caliber; the intestine indeed being stretched over the cyst like a ribbon and partly buried in it. The whole mass had so fallen over as to twist the gut above into a volvulus. There were no adhesions. The greatest diameter of the cyst (longitudinal axis of the intestine) was perhaps 16 cm., and its transverse diameter about 8 cm.

The cyst encroached so closely upon the gut for such a distance that enucleation was unwise; the integrity of the intestine at the point of volvulus was furthermore doubtful. Resection of the gut together with the cyst was done. The location was in the mesentery of the ileum, some four feet from the ileocolic junction.

At the close of the operation the child's condition was fair. He reacted indifferently. Within 18 hours he began to have convulsions, his temperature and pulse rose, and he died 30 hours after operation, his bowels meantime having moved two or three times.

Autopsy showed no evidence of leakage around the button and no peritonitis.

Laboratory Examination (by Dr. John Funke). *Specimen.* Cyst from the mesentery. It consists of an irregular globular mass being largely, from the external appearance, divided into two unequal parts, the larger measuring 10 by 6 cm. and the smaller 6 by 4 cm. The external surface of the mass is quite smooth and glistening. On this surface are many small tortuous bloodvessels.

Part of the structure which seems to tend to divide the mass appears to be a tube-like structure resembling a portion of the intestine, while the rest is a band-like structure composed of two membranes with an intervening loosely woven tissue.

On opening, the mass revealed eight pouches, all of which communicated. With but two exceptions the communications are large and wide, so that one cannot state whether the whole mass is the result of a confluence of eight smaller cysts or whether these cavities are the result of a bulging of the wall of the original cyst.

The lining of these cysts is smooth and glistening.

The mass contained 300 c.c. (an equal amount had previously been evacuated) of grayish-yellow fluid, the chemical examination of which is as follows: Reaction, neutral; albumin, abundant; mucus, none; pseudomucin, none; sugar, none; urea, 0.3 per cent.; specific gravity, 1012; NaCl, trace; neutral fat, small quantity.

Microscopic Examination (*fluid*). Cholesterin crystals, many; erythrocytes, many; a granular, apparently cellular body the nature of which could not be determined.

For microscopic purposes parts of the cyst wall were taken from various places.

Histology. The cyst wall is composed of three parts, one being very distinct and is composed of fibrous tissue and has the appearance of a basement membrane, but at no point can epithelium be seen, nor is there any evidence which would lead one to believe that epithelium had ever been present. One is not able to state that such cells might have been present at one time. Of the other two parts differentiation is difficult, one blending into the other. The middle part is mostly composed of muscle and elastic tissue, in which there are a few round rather deeply staining cells not at all unlike connective-tissue cells. The third part is principally composed of fibrous tissue. Those portions of the cyst wall taken near the mesentery contain, among the adipose tissue adjacent to the wall, one lymph gland which is normal in every respect.

Remarks. Gross and microscopic study divulges nothing as to the origin of the cyst. There is no proof by means of which one can rule out an omphalomesenteric cyst any more than there is present anything which would prove it to be such a structure. There is nothing by means of which one could say that the cyst is the result of a dilated lacteal, nor is there any proof of an enterogenous origin. The small quantity of fat present would tend to make one rule out the dilatation of a lacteal.

Case II.—Male, aged fifty-four years; Grady Hospital service. This patient had had a left-sided oblique inguinal hernia for fifteen years, and a similar hernia on the right side for six years. Both had been progressively increasing in size. He had worn a truss intermittently. For two years prior to coming to us he had been unable to reduce the left-sided hernia and it had reached very large proportions.

Patient entered hospital for hernia operation. Upon examination there was found as a part of the contents of the left hernial sac a painless globular mass not connected with the testicle, apparently containing fluid. It was too large

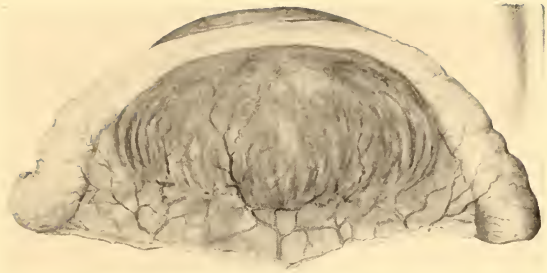

Fig. 1.—Resected portion of intestine with cyst, Case 1.

Fig. 2.—Showing mesenteric cyst found in hernial sac, Case 2.

Fig. 3.—Showing colon at hepatic flexure with cysts in mesentery, Case 3.

to be returned through the hernial opening. No diagnosis as to its character was made. It was rather presumed to be a cyst of the cord.

At operation the mass proved to be a cyst of the mesentery (Fig. 2). It approached to within one inch of the intestine. It was enucleated without difficulty. Its wall was rather thick. Its greatest diameter was about three and one-half inches. No effort was made to determine what part of the small intestine was involved. The patient recovered promptly.

Remarks. Moynihan refers to a patient of Morton's in whom the irreducibility of an inguinal hernia was due to a blood cyst. So far as I am able to discover, no other mesenteric cyst has been found in a hernial sac.

There is no way to determine whether this cyst originated before or after the descent of the mesentery into the scrotum. If it originated before such descent it had increased in size since it passed through the inguinal canal, since it was too large to be returned into the abdomen.

Laboratory Examination (by Dr. A. H. Bunce). This specimen of tissue consists of portions of a cyst wall. A part of the outer surface is covered by peritoneum; the remainder shows many adhesions of fibrous tissue. The inner surface is rough and irregular; the thickness of the wall varies from 1 to 5 cm.

Histological sections through the wall show that it is made up entirely of fibrous connective tissue. There are only a few bloodvessels present, and these have very thin walls. Much round-cell infiltration is present, and in some areas there is considerable hyaline degeneration. No definite layer of lining cells is present. Hence the histologic examination sheds no light on the origin of the cyst.

The fluid is clear, straw-colored, and has a specific gravity of 1022. Its reaction is alkaline. No reducing substance is present. Proteids are 4.7 per cent.; fats approximately 0.74 per cent. A trace of cholesterin is present.

Microscopically there are many lymphocytes, a few red blood cells, and much detritus.

The fluid is sterile.

Case III.—Male, aged thirty-two years, referred by Dr. C. M. Walker, Westminster, S. C. Patient presented himself for severe attacks of abdominal pain in the upper right quadrant recurring every one to three months, and covering three years. These seizures were accompanied by vomiting and distention. There was always difficulty in getting the bowels to move. His digestion had been bad for a year. He had lost fifteen to twenty pounds in weight. The attacks came on and disappeared suddenly, and were not accompanied by fever or chills. His symptoms were always distinctly abdominal. The patient was not jaundiced, and had not been previously.

The patient was seen some three days after an attack. He had tenderness and an ill-defined immovable mass in the right upper quadrant. The urinary findings were negative. The patient was supposed to have gall-stones with complications of a subacute inflammatory nature.

At operation there were disclosed three cysts lying in the mesentery of the colon at the hepatic flexure (Fig. 3). The outer one of these pushed down behind the terminal ascending colon for a short distance; the others were in the mesentery of the transverse colon reaching nearly to the midline. They were crowded closely upon each other, and the colon was quite taut over the mass, which had, roughly speaking, a diameter of six inches, though irregular in shape. They were enucleated by incising the outer layer of the mesocolon at the hepatic flexure and working thus inward. The first portion of the duodenum was lifted by the mass as it lay *in situ;* the third portion evidently suffered by being pressed backward against the abdominal wall.

The patient has gained twenty pounds and remains well two years after operation.

These cysts were thin-walled and contained clear straw-

colored fluid. Through an inadvertence the specimen was thrown away so that no careful examination was made.

The loss of this specimen was quite unfortunate, particularly because I found lying close against the inner wall of the cyst nearest the midline a nodule three-quarters inch in diameter, which was opened during the operation and which I was sure contained oily matter and hair. The lack of later and more deliberate opportunity to study the specimen, however, prevented such verification of the dermoid character of the nodule as would justify an unequivocal statement that it was such. Dermoids of the mesentery, especially in the male, are so extremely rare that one hesitates to so classify this cyst without indisputable evidence.

THE USE OF SKIN GRAFTS IN THE AMBULATORY TREATMENT OF ULCERS[1]

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Introduction. In the out-patient department of every large surgical clinic there are a great number of patients with ulcers of varying etiology, many of them of long standing. The treatment of these ulcers is usually carried out in a routine manner with the idea of getting through with the dressings as quickly as possible. What has been the result? Some of these patients have been cured; some have continued at the same clinic for many years, being satisfied with the temporary comfort of the dressings; others have drifted to neighboring clinics; with no better results, and finally return, only to repeat the round; while still others give up in disgust and treat themselves at home, only returning to the dispensary during acute exacerbations.

Taking into consideration the unsatisfactory results ordinarily obtained in the treatment of these patients, the economic waste to the hospital in the time taken to do the dressings and the materials used are enormous. The wage-earning capacity of the patients is nearly always considerably lowered, and in some instances their work has to be discontinued. Serious consideration has often been given to the matter, as either condition is of utmost importance to these poor people. It seemed to me that the results might be improved, and the restoration of the full earning capacity hastened, if each wound could be studied separately and treated by what we may call "intensive methods."

[1] Lantern slide demonstration.

About fourteen months ago a trial was made of this idea in the Johns Hopkins Dispensary, and I was given the opportunity to study and treat a large number of these wounds. Many old and well-proved methods were used, as well as a number of new, and some hitherto untried methods. Such favorable results were obtained that special rooms were set aside for this work and every facility given. Among a number of methods for accelerating the healing of ulcers the *transplantation of skin* was tried on a series of cases.

It has always been taught that the first essential for success in skin transplantation was absolute rest with immobilization of the part grafted. I fully agree with this principle as the ideal procedure, and believe that it should always be carried out when possible. The use of skin grafts as ordinarily done in hospitals on clean wounds, with patients in bed and having the maximum of good food, good nursing, cleanliness, fresh air, and above all, complete rest, is comparatively simple to the experienced surgeon. On the other hand, take the patients who come to the out-patient department. They are usually poorly nourished, the houses in which they live are often overcrowded and unsanitary. They are, as a rule, unable to stop their work, except for the time taken off for dressings. Many of them should be in the hospital, but there is little chance for even the few who desire admission to secure beds, as there are very few beds available for chronic ulcers. In short, rest, the factor of greatest importance in the treatment of these cases, which is emphasized by every writer on the subject, has to be entirely eliminated. With all these unfavorable conditions in mind, I began gradually to prepare certain wounds with the idea of grafting. Fortunately the first case grafted, that of a long-standing varicose ulcer, was, to my surprise, a complete success, and that success stimulated further trials.

All of the grafts were placed on undisturbed granulations.

I will not discuss at this time the methods used to bring the granulating wounds into a healthy condition, suffice it to say that many operative methods and local applications were used to accomplish this purpose. The technique of cutting, applying, and dressing the grafts was that ordinarily used.[1]

It is obvious that when the grafts are in place they must be secured so that no sliding motion is possible. This is easily done by either placing overlapping strips of rubber protective, or a sheet of paraffined mesh over the grafts, and then securing this and the overlying gauze dressing with numerous strips of adhesive plaster. Over this again is placed more gauze, and a snug gauze bandage, and finally, a muslin or crinolin bandage. Sometimes thin strips of splint wood were incorporated in the dressings.

Each patient considered in this series has continued his or her daily occupation.

This report will analyze the results obtained in the first 50 cases in which grafts were used. For convenience the cases may be divided as follows:

Summary of Cases[2]

1. *Ulcers Following Burns;* 8 cases. Males, 4; females, 4; white, 3; colored, 5.

Ages. Eleven to fifty years.

Duration. Three weeks to twenty-two months.

Situation. Leg, 6; cheek and wrist, 1 each.

[1] Skin Transplantation. With a review of 550 cases at the Johns Hopkins Hospital, Davis, J. S., Johns Hopkins Hospital Reports, vol. xv, p. 307, "The Use of Small Deep Skin Grafts," Davis, J. S., Jour. Amer. Med. Assoc., September 19, 1914, p. 985.

[2] Some of the lesions referred to in this report are, according to definition, granulating wounds. To my mind there is a distinction without a difference between a sluggish granulating wound and an ulcer covered with granulations, whatever the etiology may have been.

Size. Largest, 16 x 6 cm.; smallest, 2 x 3 cm.

Treatment. Small, deep grafts were used on 7; and whole thickness on 1.

Result. Well, 7; improved, 1.

2. *Ulcers of Leg; 9 cases.* Males, 3; females, 6; white, 8; colored, 1.

Ages. Thirty-nine to sixty-one years.

Etiology. Six were varicose ulcers with markedly enlarged veins. Three were luetic ulcers, with enlarged veins in 1.

Duration. Three weeks to twenty years, continuously; off and on, three years to twenty-five years.

Situation. Middle third, 2; lower third, 7; right leg, 2; left leg, 6; both legs, 1.

Size. Largest, 8 x 17 cm.; smallest, 2.5 x 1.5 cm.

Treatment. Small, deep grafts were used on all.

Result. Well, 6; improved, 2; unimproved, 1.

3. *Ulcers, Postoperative;* 17 cases. Males, 12; females, 5; white, 16; colored, 1.

Ages. Twelve to eighty-four years.

Etiology. The ulcers followed amputations, and operations for ingrown toe-nail, epitheliomata, and infections.

Duration. Four days to three months.

Situation. Finger, cheek, forehead, and forearm, 2 each; leg, breast, and scalp, 1 each; toe, 6.

Size. Largest, 19 x 5.5 cm.; smallest, 3.5 x 2 cm.

Treatment. Small, deep grafts were used on 16; Thiersch grafts on 1.

Result. Well, 14; improved, 3.

4. *Ulcers, Traumatic;* 9 cases. Males, 7; females, 2; white, 7; colored, 2.

Ages. Eleven to sixty-three years.

Etiology. Injuries of various kinds.

Duration. Two weeks to ten months.

Situation. Finger, 3; leg and ankle, 2 each; foot and wrist, 1 each.

Size. Largest, 8 x 6.5 cm.; smallest, 1.5 x 1.5 cm.

Treatment. Small, deep grafts were used on all.

Result. Well, 7; improved, 1; unimproved, 1.

5. *Ulcers, Miscellaneous;* 7 cases. Males, 5; females, 2; white, 5; colored, 2.

Ages. Thirteen to eighty years.

Etiology. Following infection and frost-bite, 2 each; trophic, ice-bag necrosis, and tuberculosis of chest wall, 1 each.

Duration. Two months to eight years.

Situation. Foot, 4; leg, abdomen, and chest wall, 1 each.

Size. Largest, 7 x 5 cm.; smallest, 2 x 2 cm.

Treatment. Small, deep grafts were used on all.

Result. Well, 2; improved, 2; unimproved, 3.

General Summary. Males, 31; females, 19; white, 39; colored, 11.

Ages. Eleven to eighty-four years.

Duration. Few days to twenty-five years.

Size. Largest, 8 x 17 cm.; smallest, 1.5 x 1.5 cm.

Treatment. Small deep grafts were used on 48; Thiersch grafts on 1; whole thickness grafts on 1.

Result. Well, 36; improved, 9; unimproved, 5. Of those wounds which were improved by grafting but not completely healed, 5 were situated on the foot and 4 on the leg. Of those which were unimproved, 2 were on the leg, 2 on the foot, and 1 was on the chest wall.

Remarks. All of the grafts were autografts. Small, deep grafts were used on most of the wounds, as the operative procedure is simple, and furthermore no other type of graft could have been successful on many of the wounds grafted.

In some instances where the grafts were placed close together the ulcers were covered with epithelium within a week. When a partial grafting was done, or where only a portion of the grafts were successful, a second grafting was required to fill the defect.

Several graftings were done on all of the failures, without

result. It is interesting that several of these wounds were subsequently grafted in the hospital without success, so that the failure seemed due to the wound itself, rather than to the fact that the patient was not kept at rest.

I feel confident that the percentage of "takes" would have been considerably larger had the cases been selected as to situation, cause, etc., but in order to test the procedure, ulcers in many situations, and of varying etiology were grafted. As might be expected the ulcers on the feet and legs were more difficult to heal than those in other situations, and the failures were almost entirely confined to those regions.

I have been able to observe some of these patients for over a year after grafting, and there has been no recurrence in a single instance in an area successfully grafted. In one or two cases with marked varicose veins, small ulcers on other portions of the leg have occurred, but not in the grafted area.

Conclusions. From the results obtained in the first 50 cases in which grafts have been used, in the ambulatory treatment of ulcers, I feel that we have added to our armamentarium a method of treatment which has hitherto been used only on patients resident in the hospital. In other words, the successful use of grafts in the out-patient department will make for hospital economy and will also hasten the return of many patients to full wage-earning capacity.

SPONTANEOUS RUPTURE OF THE SPLEEN

By J. E. Cannaday, M.D.
Charleston, W. Va.

An extended search of the literature in the Cincinnati Hospital Library, the John Crerar Library of Chicago, and the library of the Surgeon-General's Office in Washington, fails to disclose any reported cases of spontaneous rupture of the tubercular spleen, except one reported by Aufrecht.[1] His case was a male, forty-two years of age, with an alcoholic and a tubercular history, who, while lying in bed in the hospital talking to the orderly, complained of an unusual sensation in his left side. He requested the orderly to turn him over on that side, when he suddenly showed symptoms of severe shock and died in half an hour from the apparent onset.

Postmortem examination showed a transverse rent in the spleen 6 cm. in length. This rent involved almost the entire thickness of the spleen. Judging by the discription given, the spleen in this case was the primary seat of the tuberculosis.

Berger,[2] in an extensive study of spleen injuries, collected all reported cases prior to 1902. He found one hundred and thirty-two pathological ruptured spleens. Of these ninety-three were malarial, fifteen only enlarged, no cause stated, five in typhoid, one in typhus, one in pneumonia, three in leukemia, one in hereditary syphilis, one in liver cirrhosis from alcoholism, nine in pregnancy, one in tuberculosis, one in hemophilia, and one in varices of capsule of spleen. The tuberculosis case was Aufrecht's.

Senator and Litten[3] give as chief causes of rupture of spleen, trauma and malaria. They mention among other causes, typhus, typhoid, infarcts, pregnancy, hemophilia, anemia; naming tuberculosis as a possible cause, but cite only Aufrecht's case. Ciaccio[4] reports 9 cases from literature and 1 of his own. No cases of rupture. Bayer[5] reviews cases from literature, as well as his own. No case of rupture reported. Laspeyres[6] cites 5 cases of splenectomy for tuberculosis, but no cases of rupture. Villard and Santy[7] report 1 case of splenectomy for massive tuberculosis of the spleen. Fischer,[8] 1 case of operation for tuberculosis of spleen with recovery. Other cases cited from literature. No rupture mentioned. Sutton[9] reports a splenectomy for a case of primary tuberculosis of the spleen. Stewart[10] reports a case of primary acute splenic tuberculosis of the spleen, describes one of his own cases and cites 33 from literature. No case of rupture. Winternitz,[11] in his lengthy article on tuberculosis of the spleen, gives 1 case of his own and a table of 51 cases from literature, which, he says, includes all the cases published, except a few inaccessible ones. He does not give Aufrecht's. No cases of rupture. Death always follows if spleen is not removed. Recovery in 59 per cent. of operated cases. Lorey[12] describes 1 case of primary tuberculosis of the spleen of his own and reviews 32 from the literature, which he says are all he could find; does not mention rupture in any of them. Strehl[13] reports 1 case of his own and reviews literature. No cases of rupture reported. Vorwerk,[14] in an extensive essay on rupture of the spleen, only mentions Aufrecht's case of rupture of the tubercular spleen. Neither Rohrbach,[15] Romann,[16] nor Schrira,[17] in their very extensive dissertations on this subject, report any cases of spontaneous rupture of the tubercular spleen. Weil,[18] in his review of tuberculosis of the spleen, reports no cases. Von Bruns, in his new *Handbuch der Praktischen Chirurgie,* says rupture of the spleen is very rare in tuberculosis, but does not cite any cases.

Schubert and Geipel[19] describes 1 case of their own and cite 33 from literature. No case of rupture.

Garrow[20] says: "Primary tuberculosis of the spleen is rare. A few cases have been diagnosed prior to operation or autopsy. Secondary involvement is more common in children, less so in adults. In both forms the spleen is moderately enlarged; the parenchyma is soft, swollen, dark red in color, and scattered over with minute, round, gray tubercles. In the chronic form, cheesy nodules, as large as hemp-seed or hazel-nuts, may be rarely found, since death usually occurs before such changes have taken place. Splenectomy is indicated for tuberculosis of the spleen, provided the diagnosis can be made and that the disease does not exist elsewhere, at least in a severe or active form." Johansson,[21] in his very extensive contribution on the subject of Spontaneous Rupture of the Spleen, was also only able to find 1 case of spontaneous rupture of the tubercular spleen, that reported by Aufrecht.

Primary tuberculosis of the spleen is uncommon, but occasional cases are seen. I found one postmortem several years ago, and I wish to present a brief report of the case which I find to be an unusual one:

March 20, 1912, a patient, M. T. M., was brought to me by Dr. W. H. Wilson, of St. Albans, West Virginia. He had been to Mt. Clemens for a month taking treatment for what was supposed to be rheumatism, and while returning to his home, on the train, felt a sudden severe pain in the abdomen, which persisted. The patient became very weak and faint on the train, but managed to reach his home. Dr. Wilson was called and saw him four or five hours after the initial onset. He found him suffering from pain and shock. Morphine was given to relieve the pain. The patient had a most uncomfortable night and his pulse rate gradually increased. Dr. Wilson then brought the patient to the hospital, where I first saw him, and elicited the following history:

The patient was a male, aged twenty-four years, barber by

trade, had had the usual infectious diseases of childhood, was never robust and always a little under weight. Had been feeling badly for more than a year, but had continued to work at his trade most of the time. Had had occasional abdominal pains; urination had been rather frequent, but he had not deemed his supposed indisposition of sufficient importance to consult a physician until about six weeks before I saw him. He, at that time, was having occasional irregular pains and tenderness in the principal joints of the long bones, along with some fever and had diagnosed his case as one of rheumatism. He left his physician and on his own responsibility went to Mt. Clemens, where he remained for a month taking baths and other antirheumatic treatment. The joint pains subsided and he left for his home, a day's travel by train.

He was lying on his back complaining of much pain on any motion; pulse 140, small volume; temperature, 98° F.; respiration, 28 per minute; facies that of shock. There was dulness in both flanks. A diagnosis was made of abdominal hemorrhage and immediate exploratory laparotomy advised.

He was hastily prepared for operation and under ether anesthesia administered by Dr. B. S. Preston. A right rectus incision about 10 cm. in length was made; an abundance of free blood was present. The abdomen was explored and a search made for the source of bleeding. On palpating the spleen, a decided rupture was felt on its median aspect. I compressed the pedicle between the thumb and the fingers of the left hand and made an incision about 17 cm. in length in the left side of the abdomen over the splenic area. The spleen was easily delivered, and its pedicle was clamped preparatory to removal. In bringing up the spleen it was noted that the tip of the tail of the pancreas was adherent near the edge of the rent.

The hemorrhage had been very great and the abdomen was filled with free blood, while near the spleen and extending for a short distance under its capsule, was a considerable

amount of dark, coagulated blood, evidently the result of a previous hemorrhage, which took place under the capsule of the organ. The spleen was removed and its pedicle secured *en masse*, after which the principal vessels were each ligated separately for further security. Aside from the spleen, the abdomen was found to be negative, with the exception of the right kidney, which was evidently completely disorganized from disease (probably tuberculosis) as it had the feel of a bag filled with fluid. Part of the free blood was sponged out, and the two wounds were closed without drainage.

The spleen was about 15 cm. in length, 10 cm. in width, and 3 cm. in thickness. There were numerous tubercles on its surface. In the body of the viscus there were a number of pockets containing caseous material. In some parts of the organ there were calcareous deposits also. The caseous masses varied from 1 cm. to 2.5 cm. in diameter.

The tear in the spleen was distinct and ragged. It was fully 7 cm. in length and 1.5 cm. in depth at its deepest part. The patient made a fair operative recovery. His wounds healed primarily. The pulse gradually subsided to 120, and the temperature, while fluctuating considerably, came down to nearly normal and varied from 99° to 100° F. He left the hospital on the fourteenth day for his home. I urged on him the importance of having the right kidney removed, but he did not return to have this done. After arriving at his home, he gradually declined and died two months afterward. No postmortem was obtained.

Bibliography.

1. E. Aufrecht. Ein Fall von Milliartuberculose der Unterleibsorgane, Scrophulose der retroperitonaealdrusen; Tod durch Milzuptur, Archiv f. Pathologische Anatomie., Virchow, 1866, xxxvii, 422.

2. E. Berger. Die Verletzungen der Milz und ihre chirurgische Behandlung., Arch. f. klin. Chir., 1902, xlviii, 768–817.

3. Senator and Litten. Disease of the Kidneys and Spleen, Nothnagel's Encyclopedia of Clinical Medicine, 1905, p. 670.

4. C. Ciaccio. Primare tuberkulose Splenomegalie, Deutsch. Ztschr. f. Chir., 1909, xcviii, 464–473.

5. Josef Bayer. Ueber die primare tuberkulose der Milz., Mitt. a. d. Grenzgeb. d. Med. u. Chir., 1904, xiii, 423–541.

6. Richard Laspeyres. Indications and Results of Total Extirpation of the Spleen with Observations on its Physiological Effects, Zentralbl. f. d. Grenzgeb. d. Med. u. Chir., 1904, vii, 1–95, 145–182, 219–241.

7. Villard and Santy. Splenectomie pour tuberculose massive de la rate.

8. V. Fischer. Ein Beitrag zur Kenntnis der isolierten Milztuberkulose, Wien. med. Wchnschr., 1909, lix, 2505–2511.

9. B. Sutton. Splenectomy for a Wandering Tuberculous Spleen, Practitioner, 1898, lx, 288.

10. D. D. Stewart. Acute Splenic Miliary Tuberculosis, Amer. Jour. Med. Soc., 1901, cxxii, 309–316.

11. M. C. Winternitz. Tuberculosis of the Spleen, Arch. Int. Med., 1912, ix, 680–997, 1 pl.

12. A. Lorey. Ueber Milztuberkulose, Beitr. z. klin. d. Tuberk., 1912, xxiv, 235–253.

13. Hans Strehl. Ueber Milztuberkulose, Arch. f. klin. Chir., 1909, lxxxviii, 834–844.

14. Vorwerk. Subkutane, Zerreissungen der gesunden und kranken Milz., Deutsch. Ztschr. f. Chir., 1911, cxi, 125–203.

15. Rohrbach. Subkutane traumatische Milzrupturen und deren Behandlung, Berlin, 1909.

16. Romann. Subkutane traumatische Milzrupturen, München, 1904.

17. Schrira. Ueber die subkutane Milzrupturen, Berlin, 1902.

18. P. E. Weil. La tuberculose de la rate, Rev. internat. de la tuberc., 1912, xxii, 85–91.

19. Schubert and Geipel. Ueber sog. primare Milztuberkulose, Münch. med. Wchnschr., 1914, lxi, 1852–1854.

20. A. E. Garrow. Surgery of the Spleen, Bryant and Buck, System of Surgery, viii, 59–77.

21. S. Johansson. Contribution a l'étude des ruptures spontaneous de la rate, Revue de Chirurgie, Paris, 1912, xlvi, 58–82.

DISCUSSION ON THE PAPERS OF DRS. JONES, DAVIS, AND CANNADAY

Dr. Randolph Winslow, Baltimore.—I would like to say a word or two with regard to ulcers of the leg, and particularly with reference to that variety of ulcers we are accustomed to speak of as varicose ulcers. I have never seen a varicose ulcer of the leg, even one of twenty years' duration, that you could not heal in three or four or possibly six weeks' treatment. Perhaps it would take a week or so for the leg to get in better condition, but by strapping these cases with adhesive plaster and bandaging them the ulcers heal. The books recommend that the adhesive straps be applied in an oblique manner and imbricated. The adhesive straps are applied transversely across the face of the ulcer—the ulcer runs in the long diameter of the limb—and the straps are applied so as to embrace about one-half the circumference of the limb under tension, after a certain amount of betterment has been obtained by elevation of the limb and rest, and not imbricated but the edges somewhat apart, so that the pus has a chance to escape, it is better than strapping them in an oblique direction with the straps overlapping. Personally, I have had satisfactory results following the application of adhesive straps and bandaging from the toes up to the knee. After the ulcers are cured these people should wear a bandage, and that bandage preferably in my opinion should be a cotton flannel bandage. It is elastic and light, allows transudation of sweat, and does not irritate the limb as more impervious material would.

The results Dr. Davis has shown are extremely gratifying.

Dr. Alexius McGlannan, Baltimore.—As to the healing of ulcers, we have learned from Dr. Davis that if we use small, thick grafts, the full thickness autografts, on burns and other traumatic ulcers, these wounds which are often slow to heal may be rapidly covered with epithelium. If the healing of wounds like the granulating stumps of traumatic amputations, where ordinarily there is a long period of disability, can be hastened by grafts, then Dr. Davis has made a valuable contribution to our means of treating these injuries.

As to pressure bandages, we find the so-called Bender bandage the most valuable pressure bandage we can use in leg ulcers. It is made of mesh. It is elastic and porous, and if it is washed with soap and water, after it is dry its elasticity returns, and it is therefore a bandage that can be used for a long time.

Dr. Joseph H. Watts, Charlottesville, Virginia.—I was much interested in Dr. Jones' paper, having recently had a case of mesenteric cyst. In this case, a young child, the cyst was situated near the ileo-cecal junction and produced obstructive symptoms; in fact, the child was admitted with a diagnosis of intussusception; though there was no history of discharge of bloody mucus from the bowel, which I find an almost constant symptom in intussusception in children.

In some of these cysts of the mesentery it is almost impossible to excise the whole cyst wall without damaging the circulation of the intestine and I believe a procedure, which I used in the case cited above, is a valuable one, namely, marsupialization of the sac. A considerable portion of one side of the cyst was excised and the lining of the remaining portion of the cyst attached to the edges of the opening in the mesentery by a running suture of catgut. After several months there was no evidence of refilling of the cyst.

Dr. Jones (closing the discussion).—I have nothing further to say except to call attention to one other region of these cysts to which I barely referred. A short time ago R. T. Miller, of Pittsburg, published an exhaustive study of a cyst which came under his observation and which was unquestionably a sequestration from the intestine. His cyst had the various layers of muscular and epithelial tissue as well as villi. There are a number of cases reported in which such evidence cannot be denied. Lewis has published an article in which actual sequestration of portions of the intestine was shown not to be infrequent, and since then the subject has taken on new interest.

AMBULATORY TREATMENT OF FRACTURE OF FEMUR, WITH PLASTER ENCASEMENT AFTER APPOSITION UNDER *X*-RAY[1]

By Robert Carothers, M.D.
Cincinnati, Ohio

If five experienced surgeons were each asked the best treatment for a fractured thigh, it is probable that four, perhaps five, different answers would be given. A review of the literature of this subject would argue the truth of this statement. Since there is not an unanimity of opinion, there is, then, no best treatment for fractured thighs. If I were, myself, asked this question I should say the treatment very largely depends on the age, sex, occupation, and environment of the patient; whether the fracture is simple or compound, complicated or comminuted, and in which part of the bone it should happen to occur. In brief, each case is a law unto itself, and the best possible results with the least possible inconvenience to the patients is the treatment which will eventually appeal to the experienced surgeon.

In looking over my records for the four years ending November 30, 1914, I find twenty-six fractured thighs: Eleven intracapsular fractures of the neck; two extracapsular; one in the upper third of the shaft; twelve in the middle or lower shaft. The intracapsular cases were six men and five women, ranging in ages from thirty-five to

[1] In order to be as brief as possible I have used no pictures, *x*-ray plates or quotations. In this Society it would seem unnecessary.

eighty-one years. One man was a locomotor ataxia victim; another had an old right hemiplegia following lues; two had an impaction, which was retained; one, a man, came from Cleveland to Cincinnati as an ordinary day coach passenger and without assistance before a diagnosis was made.

A diagnosis, so necessary, is not always easy in an intracapsular fracture; at times impossible without an *x*-ray examination. Where impacted, every effort is made to save it, which can be done by commencing treatment at once. These cases are immediately put in a plaster spica and otherwise treated as below given. When not impacted the treatment followed has been that advocated by Whitman, of New York: Apposition by manipulation under anesthesia; encasement in a plaster spica in extreme abduction, including the foot and lower ribs; thence proving apposition by *x*-ray examination, and when found correct allowing the patient up with a raised shoe on the opposite foot and a pair of crutches for ambulation.

These eleven cases had bony union, and after a period averaging four months were able to walk on their injured legs. Nine are still alive and have resumed their usual vocations. The locomotor ataxia case died two months after leaving the hospital of an acute intestinal trouble. An old man aged seventy-five years died of heart disease, while in Florida for the winter, eight months after treatment was finished.

One of the extracapsular fractures was treated in a similar manner, the other with a Lane plate, afterwards removed. Bony union was the result in each case. One has been at work as a railroad engineer six months, after being off about eight months. The other, a case of discondrophy, is just leaving the hospital.

In cases of fracture of the shaft of the thigh there are several rules universally followed. Never am I in a hurry to set such a fracture; a week or ten days is plenty of time.

This will give time for the hemorrhage to cease and the clot to be at least partially absorbed. Experience tells me that it is the swelling and clot in the early stages which causes shortening, not muscular action. Why, then, overcome by traction with suffering to the patient, something which can not be overcome—the shortening? I much prefer for ten days to make the patient as comfortable as possible with any ordinary dressing which will immobilize the leg and put him to bed with an ice cap at the seat of fracture. An apposition which is difficult or impossible twenty-four hours after the fracture has occurred is done with ease ten days later. During this time one can ascertain by *x*-ray and physical examinations just what he has to deal with and prepare for its execution.

The patient is placed on an extension frame, preferring myself one made and devised by Dr. R. D. Maddox, of Cincinnati. The position of the upper fragment is definitely determined and the lower fragment is made to meet the upper. In this position traction and counter-traction are effected and apposition proved by an *x*-ray plate. When found correct, a plaster spica is applied, including the foot and up to and including the lower ribs, care being taken that it is well-moulded around the pelvis and securely fitted in the groin, padding used where needed. After the plaster has set, apposition is again proved by another *x*-ray examination. If the position of the fragments is known to be correct, and, if the spica be correctly applied, the apposition can be just as certainly continued now as in any other method of treatment. A raised shoe on the other foot, a pair of crutches, and a passport for ambulation are all that will be needed for a period of eight to twelve weeks, when the spica can be removed and massage of the leg instituted.

In compound fractures the *x*-ray is not so necessary, since the apposition can be encouraged and determined through the opened wound. The treatment otherwise is the same, except a window cut in the plaster for dressings.

For a period of two to four weeks after the removal of a spica, much care and caution should be exercised to prevent weight bearing which may sometimes cause an unnecessary shortening or bending of the leg.

On account of the difficulty of maintaining apposition in the fracture occurring in the upper third, a Lane plate was used very advantageously for that purpose in addition to the plaster spica. Otherwise this case was in no way differently handled. The end result was good, the patient returned to work in eight months. The Lane plate has given no trouble.

One shaft case was in a baby two years old, three in boys ranging in ages from seven to ten years. These cases were the easiest handled and the results more quickly and firmly secured.

A robust fellow, aged twenty years, had two fractures in each thigh, one compound, also two breaks in each leg below the knee; there were eight fractures in all. Apposition with the *x*-ray was used and encasement in plaster. He was not ambulatory. In six months he was able to walk, in eighteen months he returned to work as a rigger.

One operative case I would include. A girl, aged twenty years, with a scoliosis, was discovered to have one leg an inch and a half longer than the other. No reason could be determined for this condition. An inch and a quarter was removed in the lower part of the shaft by a transverse section and the two ends brought together. Apposition was so perfect that plating was not considered necessary. In this case the plaster spica did not include the foot, in order to bring some weight bearing on this leg in ambulation. Ten days after operation the *x*-ray showed apposition to be correct and she was given crutches and allowed to walk on both legs. It is now a year, the scoliosis has disappeared and the result so perfect she can Tango.

Two cases were in the country where the *x*-ray was not available. One a child quite easily handled, the other a

farmer near Leesburg, Ohio, in the practice of Dr. K. R. Teachnor. By correspondence with the doctor all preliminary treatment was directed. On the twelfth day after the accident the paraphernalia was taken to his home and apposition and encasement effected as above described excepting *x*-ray examinations. During the repair of his fracture he was able to be about the place and in a small way direct some of his farming. The end result after four months' time was bony union with one-half inch shortening.

One case was quite a disappointment. A laborer with a simple fracture in the lower third. For some unknown reason apposition was difficult and retention insecure. He was Irish, an alcoholic, and nervous beyond description. Union seemed impossible until he was made to bear weight on the injured leg. This eventually brought a bony union but with two inches shortening and considerable deformity. He is now at work eighteen months after the injury. No other cases were of special interest.

The fundamental principles in the treatment of fractures, wherever found, are apposition and retention. In fractures of the femur experience has taught me that apposition is best made in the manner above described, and that retention is possible by plaster encasement if one will take the time and patience to establish a plaster technique. There are a few cases where this is impossible, when some operative measures are necessary. One, perhaps two such cases are given.

The ambulatory treatment has the advantage of giving a patient exercise and preventing congestion of the lungs or kidneys, which is so necessary in the aged. It causes a certain amount of hyperemia, which hastens union and also the use of the leg. It prevents complete invalidism and permits of some business activity necessary in some cases.

CONTRIBUTION TO THE CURE OF CANCER OF THE UTERUS BY CURETTING FOR DIAGNOSIS

By H. J. Boldt, M.D.
New York

Before presenting for your consideration the details of the case which induced me to address you on the subject chosen, permit me to give what are practically a few extracts concerning the pathology of cancer, particularly of uterine cancer, from the work of Schottländer and Kermauner. And I may add for the benefit of those interested in the subject, that the book written by our colleague, Dr. Thomas S. Cullen, is without equal in the English language.

I have studied very carefully each case presented in Cullen's book, as well as in that of Schottländer and Kermauner, and can assure you that the books are not only scientific and instructive, but fascinating. I trust that Cullen's may soon see another edition. No one should miss the opportunity to profit by its careful perusal. I also trust that the work of Schottländer and Kermauner may soon be translated into English, and so become available for those who do not read German.

Scheib.
- Cancerous tumors with typical epithelial arrangement.
- Pavement-epithelium cancroids.
- High adenomatous cylindrical-cell cancer (malignant adenoma) and
- Tumors with atypical epithelial arrangement.
- The cancer or carcinoma simplex.

Solid Cancer:

Nests filled solidly with epithelium (in the tissue). Primary solid carcinomata never take a glandular character.

Pavement-epithelium cancer is divided into ripe, middle-ripe, and unripe. The individual nests are called ripe when distinctly crenated cells are present; middle ripe and unripe when crenation is absent; immaterial whether cornification is present or not. Between middle ripe and unripe or immature nests we differentiate in the sense that in the middle ripe a larger number of polygonal, even well-defined cells are present; whereas in the unripe, they show no cornification, the small round or elongated formed, or irregularly formed elements are in preponderance.

Fabre-Domergue and Bard, and Borst have also accepted a similar division.

It is advisable to divide carcinoma of the uterus into primarily solid (secondarily, occasionally glandular-like) and into primarily glandular (secondarily, frequently solid) carcinoma.

The primarily solid carcinoma subdivide into ripe, middle-ripe and unripe without consideration of the duration of the disease, only taking into consideration the morphology of the nests; and under "ripe" those forms are included which give the principal characters of pavement-epithelium.

The primarily glandular carcinomata occur very seldom in the form of pure glandular formations with single layer-epithelium — adenoma malignum. Usually superimposed layers are formed in addition, whereby secondarily, the formation of solid nests may occur.

These glandular carcinomata, the so-called adenocarcinomata, in which originally the glandular type is well marked, and to which also the papillary form belongs, one may contrast with the carcinoma glandulare, in which by primary filling of the glandulum, the glandular character becomes soon obliterated. Both forms combine and in an advanced stage cannot be differentiated.

The primarily solid carcinomata are most frequently unripe, seldom ripe. The remainder of scirrhus cancers, in contrast with the non-scirrhus, is small. The primarily

solid carcinomata are more often medullary than scirrhus (more often but little stroma is recognizable between the nests, rather than a large quantity).

A very important point is made by Lubarsch, with which the greater number of authoritative pathologists coincide, that it is impossible for him to diagnose cancer, no matter by what method, until there are positive and clear signs of the destruency of the growth. He says that he is aware that gynecologists ask more and believe that they can accomplish more; but as a matter of fact only a probability can be assumed, unless evidence of destruency is present. Just as Virchow said many years ago, it is maintained by Ponfick, Ribbert, Borst, Albrecht, Henke, Herxheimer, Lewin and many others, that a more or less complete identity exists between normal cells and those of incipient cancer.

Not a single investigator, including Ribberts, has been able to demonstrate a carcinoma, just beginning, without the criticism of subjective interpretation.

So long as experimentation leaves us so obstinately in the lurch, we are still compelled to rely, as formerly, on experience to draw conclusions from those cases invariably recognized by all as cancer; to convey these conclusions to the beginning of the disease, and by this means in general, or in the individual case, reconstruct the diagnosis of the respective early stage:

By this again a subjective moment enters into the discussion, so that a definite conclusion need not soon be expected even in this small chapter of the cancer question.

Still, we cannot fully endorse the resignation of Lubarsch, concerning the diagnosis of cancer in all instances, when no destruent growth is present; it is a further question in which stage recognition is possible, if there are specific morphological criteria for a beginning carcinoma, a question which is generally rejected.

The time is past when changes in the epithelium, particularly when an ingrowth of the latter is shown, may be indiscriminately designated as cancer.* With the aid of clinical observation, on the basis of experimentation, it has proved that such occurrences may take place in entirely cancer-free uteri and uteri remaining free of cancer.

The main distinguishing reliance is placed upon the formal character of the cells and nuclei. The absence of mitoses and the typical arrangement of the epithelium are dwelt upon by Aeri.

In suspicious carcinoma there is irregularity of the cells in size and form, as well as large nuclei rich with chromatin. And Schauenstein speaks of the poor staining of the protoplasms and eosinophilia.

How difficult it is sometimes to make a positive diagnosis may be seen in Figs. 96*a* and 97, Plate 14, in which the diagnosis is withheld, although it is plausible that the merging into malignancy might be assumed, particularly in Fig. 96 (Schottländer's book, p. 532).

Attention is called to the superimposing of epithelia in which, sometimes, the epithelia lying inward take on a club-shape, and in which, occasionally, large nuclei are present in the so-called or genuine pregnancy glands (Opitz-Zeitz), and which may easily lead to the diagnosis of cancer; so that in some pictures a diagnosis must be refrained from, because only normal cell formations may be present.

Considering the character and appearance of the glands depicted on p. 539, Figs. 103 and 103[1], no doubt need arise in the first; but the carcinomatous condition of Fig. 103[1] brings decided doubt because of the wide zone of normal tissue between it and the corporal cancer.

It is quite easy to recognize a glandular carcinoma after the type of adenoma malignum with atypical superimposed layers of epithelium (so-called adenocarcinoma) or a papil-

* See Schottländer and Kermauner, p. 529, Fig. 100.

lary glandular carcinoma, but the distinction may become very difficult if the chief characteristic feature of malignant adenoma—single-layer epithelium—remains.

But now let us take another point of view, strictly from the standpoint of the clinician (see illustration 108*b*, p. 542), where a positive diagnosis is withheld, although a beginning malignant adenoma cannot be excluded. I, from my point of view, would advise a vaginal hysterectomy in such a case, unless there were very important reasons to keep the patient under further observation, and then this should be done on the patient's responsibility.

It is certain that there are no specific morphological criteria for the recognition of the first-forming carcinoma cells. On the other hand, it seems possible in some instances of cancer, where there is an absence of destruent growth, to make the correct diagnosis, even if the epithelium is still *in situ*.

We must emphasize not only in "the atypical direction of the growing but rather in the faultiness of structure." We are of the opinion that, especially in the earliest stages, the faulty structure impresses as particularly marked, and, especially in primarily solid, less so in primarily glandular (secondary solid) carcinomata, facilitates recognition.

To obtain an opinion, one must know the morphologic, physiologic and formal qualities of the parent cells. Also the clinical data, the macroscopic appearance and the direction of the sections must be considered.

A surface growth alone of cancer of the uterus, in the sense that only the mucosa is affected, is very rare; but still it may occur, in the primarily solid, as well as in the primarily glandular carcinomata.

Cullen says that solid carcinomata penetrate more rapidly into the depth than the glandular; but, in our opinion, this may vary.

We have not observed the proliferation of glands into lymphatic vessels; and in case of glandular carcinomata in

a histological sense, such proliferation is likely to be long delayed.

The propagation of cancer to the uterus by the lymphatics from the parametria is not as exceptional as is generally taught. The deformation of the uterus is important.

While it is possible to ascertain, in the greater number of cases, whether a carcinoma has its primary seat in the corpus or in the collum, this does not apply to the distinction between cervix and portio cancer.

Among the solid cancers the immature, which occur more frequently, are more malignant than the others. This holds good for the large and medium-sized tumors. In the latter, the adjoining structures are affected one-third less often.

A collum carcinoma, if somewhat advanced, when the question of a pure malignant adenoma may be excluded, cannot, as a rule, be distinguished from a corporal cancer by microscopical examination, because the cervical epithelium loses its original characteristics and resembles the corporal epithelium.

A clinical factor ascertained by local examination is that infiltrated parametria may be free from cancer, whereas yielding, soft parametria may be carcinomatous. But stress must be laid on the presence of small parametric lymph nodules, which may be found carcinomatous in otherwise free connective tissue.

The vagina is involved, in from 40 to 50 per cent. of all cases, but not necessarily in its superficial surface, but lymphatically; hence the necessity to try to extirpate not less than the upper one-third of the vagina.

One must not be led entirely by the palpatory findings for an indication for a radical operation, because, as already noted, seemingly unfavorable cases may be free from later recurrences. When the abdomen is opened, one can form a better opinion.

An exceptionally important clinical deduction may be made from the careful pathological studies of cancer by

Schottländer and Kermauner in the fact that all small cancers were within the compass of laceration-ectropium in the neighborhood of the external cervical orifice.

The following case forms the basis for my contribution:

In November, 1913, a woman, forty-seven years of age, presented herself for examination. She had been married twenty-two years, and had never been pregnant. She complained of the usual symptoms accompanying the climacterium during the last two years. She asserted that she had been menstruating at intervals of four weeks. (It was learned later that there had been some irregular bleeding for some time, and that she had had a small cervical polypus removed by a physician, which, however, did not stop the irregular loss of blood, which is frequently seen, too, at the climacterium.)

Her complaint at the time of consultation was extreme weakness, pain in the right lower abdomen, frequent urination and marked nervousness. Pelvic examination showed nothing abnormal, and rested on a diagnosis of mild cystitis, limited principally to the trigonum, and neurasthenia. She then told me that she was desirous of knowing whether she had cancer because she was told that this had been diagnosed from curettings that had been procured from her. A careful intra-uterine exploration failed to find any evidence of an abnormal endometrium. Still, to be on the safe side, another curetting was done very thoroughly by me about two weeks after the original diagnostic curetting, and from the scrapings serial sections were made and a large number were examined by a very competent pathologist, Dr. Victor Neujean, a pupil of von Recklinghausen, and later pathologist at the Gynecological Department of the University of Münich, and still later to the Imperial Frauenklinik at Berlin. Nothing indicative of malignancy was found, as may be seen in Fig. 1.

Later an opportunity was given me to see the sections upon which the diagnosis of cancer was based, through

courtesy of the pathologist who examined them. No material or other sections had been retained by him to permit further study. From these it is evident that cancer is present in them (see Fig. 2); moreover, from the appearance shown in Fig. 3, it is obvious that the cancer is not in an early stage, showing fairly deep invasion of the muscularis. It was because of this well-advanced carcinoma that the several pathologists of international reputation, among others, Wm. H. Welch and Thomas S. Cullen, of Baltimore; Schottländer, of Vienna; and Jonathan Wright, of New York, who had seen these various sections, expressed it as their opinion that the scrapings in all probability did not come from the same patient, but that a mixup of specimens had occurred. Against this, however, was the positive statement of the pathologist.

But to make doubly sure, another curetting was done by me about three months subsequent to the first curetting; and again the findings were absolutely negative. The endometrium had not even regenerated in all places, so thoroughly was my previous curetting done. The question of a polypoid growth in the uterine cavity was negated, hence we had a straight ordinary adenocarcinoma of the body of the uterus.

If we accept the assurance of the pathologist that no error in specimens could possibly have occurred, this is undoubtedly the first case of this character on record, so far as published cases are concerned. But I should like to hear an expression of opinion from the members of this Society, some of whom undoubtedly must have had a large experience.

In the November meeting of the Section on Obstetrics and Diseases of Women of the New York Academy of Medicine, Dr. J. L. Ladinski read a paper on this subject and gave a review of cases bearing on this theme; and in this he included the case cited by me (his own case No. 2). While his review was interesting, it had no bearing on the particular instance cited by me (Ladinski's case No. 2) since

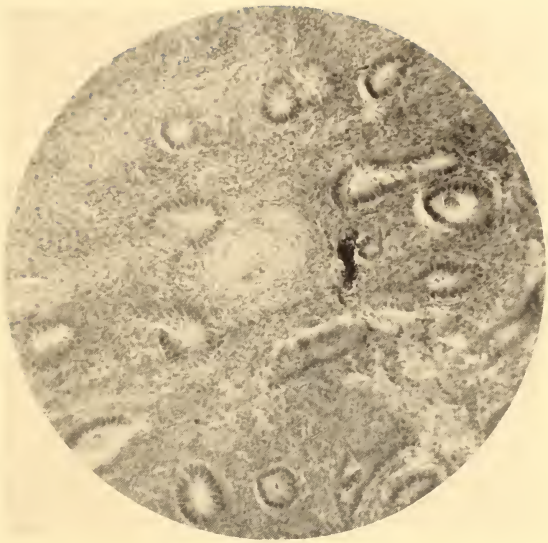

Fig. 1.—Microphotograph of section of scrapings removed two weeks after curetting by Dr. Ladinski.

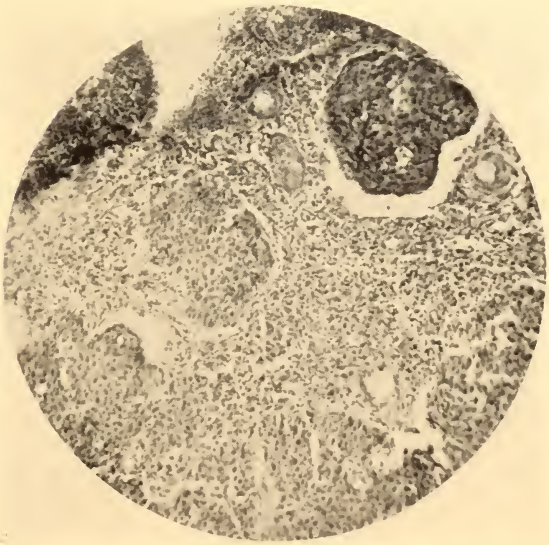

Fig. 2.—Alveolar cancer.

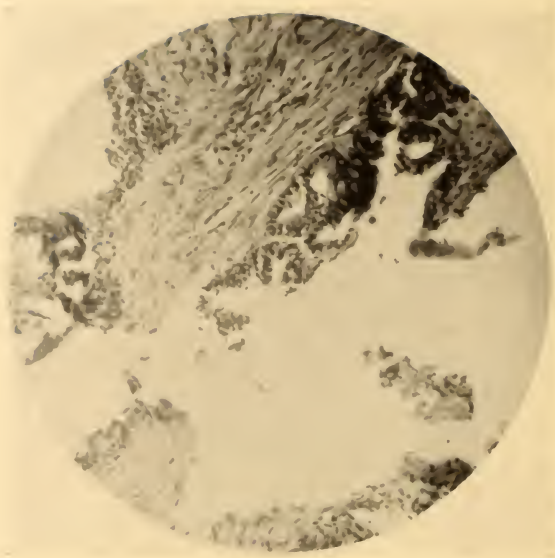

Fig. 3.—Shows invasion of cancer into muscularis.

that case (the one cited by me as forming the basis for my address) was not analagous to any other one published. All cases ever cited (excepting the case mentioned by me, Ladinski's case No. 2) were *early* cancers.

Now, Schottländer, in his report to me, in connection with that case, says that he could conceive of the possibility of the cancer having been radically removed, if he knew how the curetting was done. That is, if it were done with particular thoroughness over the cancer area. My information is, however, that an ordinary curetting was done, without any particular effort to do it especially deeply, or over any particular area.

I assert that I do not believe that we have any reason to speak of the spontaneous cure of cancer. All alleged cases of spontaneous cure of cancer are, in my opinion, due to a misconception. There is not a single known case in a human subject, in which the cancer has retrograded spontaneously, in which it did not later show metastases or recurrences. According to von Heisemann[1] the spontaneous cure of cancer belongs to the realm of medical superstition. If Theilhaber[2] expresses the opinion that spontaneous cure occurs more frequently than is thought, the opinion is based probably on non-knowledge of facts.

It happens occasionally that a small metastasis retrogrades without leaving a trace; but it happens more frequently that metastatic carcinoma cells become tumors. Sooner or later recurrences will take place. The recurrence may be very soon, or it may be after many years. In some instances, twenty years or more elapse. By internal medication it has been impossible to cause typical carcinoma to disappear. Small neoplasms of the face, for instance, are occasionally caused to disappear by arsenical therapy; but even though these neoplasms show carcinoma-like structure, it is doubtful to some that they are really carcinoma. Carcinomata and sarcomata are only cured when their cells are completely destroyed.

After labor[3] Winter and Ruge,[4] Schottländer and Kermauner[5] and others say that the carcinoma of the uterine body always begins in the mucous membrane, and permits, according to the extension of the primarily effected part, a division into the following three pictures:

1. *Diffuse carcinoma,* a uniform effection of the entire corporal endometrium.

2. *Circumscribed carcinoma,* an invasion of a circumscribed area of the corporal endometrium, leaving the remaining parts of the endometrium free from affection.

3. *Polypoid Cancer,* a very circumscribed area, with or without pedicle, arising from the uterine mucosa in the shape of a polypus, which may fill the uterine cavity, and by further growth, may distend it. Such polypoid carcinoma is soft, friable and disintegrates at its surface, whereas its dissemination into the depth is negligible. The remaining part of the mucosa is normal, only at times inflamed. The growth of the neoplasm takes place into the uterine wall or toward the uterine cavity. All carcinomata which have a tendency to develop toward the uterine cavity are less prone to infiltrate the uterine wall, whereas, those that extend into the uterine wall rarely form marked neoplasms in the uterine cavity.[4]

In my opinion, these pictures of carcinoma, accepted and described by all authors, must be looked upon as very important in connection with the possible cure of carcinoma by curetting. The acceptance of the definition of the original local origin is important.

The cancer begins locally. According to Carl Ruge, cancer of the body of the uterus begins most frequently either with atypical and irregular proliferation of the gland tissue without primary superimposing or irregular papillary proliferation of the epithelium of the utricular glands (genuine adenocarcinoma). These early carcinomatous stages always begin in the mucosa and, as Carl Ruge says, one not infrequently has an opportunity to see these early

stages when doing a diagnostic curetting, when they have not yet passed the boundaries of the mucosa. There are polypoid proliferations of the mucosa, in which alone the carcinomatous origin has been demonstrated, separated from the organ proper by perfectly normal layers of tissue. In such cases the cancer may be radically obliterated by thorough curetting with a sharp instrument.

Carl Ruge cites such a case in which, after hysterectomy, it was impossible to find further evidence of carcinoma in the uterus. The diagnosis had been made by him from diagnostic scrapings of such polypoid proliferation of the uterine mucosa. The carcinoma was sharply limited to this polypus. The remaining parts of the mucosa that were seen and studied in the specimen were nearly normal, and certainly not suspicious.

In the case that was described by P. Prym[6] the conditions were similar. It concerned a woman, forty-nine years of age, who had complained for three months of atypical bleeding and putrescent leucorrhea. Because, clinically, suspicion of carcinoma existed, a diagnostic curetting was done. The curetted material consisted of many mucous membrane shreds, among which was a larger formation, about the size of a small hazel-nut. This showed, histologically, a typical adenocarcinoma, whereas the remaining particles were free from suspicion of carcinoma. Extirpation of the uterus was done eight days later.

To the astonishment of the author, it was a myomatous uterus about which not a trace of carcinoma was found, even numerous parts of the uterine wall were examined histologically. The patient remained well. The author admits that in this case it must be accepted that the carcinoma was entirely removed by the curetting. One may deduce, however, from the shape of the piece removed, that it was a small carcinomatous polypus, so that the possibility of complete obliteration by curetting becomes understandable.

A third case, according to von Heisemann, was seen by Koblanck. In the case of that patient it did not concern a polypoid cancerous proliferation, but a pavement-epithelium carcinoma of the uterine body. After extirpation of the uterus it was impossible to find anything further carcinomatous. The endometrium of the somewhat enlarged uterus was everywhere, insofar as it was not removed by the curetting, in a normal condition. This form of carcinoma is rare and always begins on the superficial surface of the mucosa with metaplastic transformation of the superficial epithelium.

A fourth case is described by Heis.[7] The patient was forty-one years of age, and for three months complained of irregular bleeding with leucorrhea of foul odor. After curetting, the diagnosis of adenocarcinoma was made by Privy Counsellor von Heisemann. But, because the sister of the patient had succumbed to a hysterectomy for cancer of the uterus, a radical operation was declined. Nothing further was done, and after the lapse of some time the patient returned for reëxamination. The uterus had decreased in size and the suspicious manifestations (bleeding and leucorrhea) had disappeared. Now, after three years, the patient is still healthy, and may be considered cured, at least clinically. But here, a repeated histological examination has not proved that the patient is also cured anatomically. No one can say whether, in this instance, we may not have a latent stage of carcinoma, which, according to Brettschneider[8] and Fromme[9] may occur. Only the future can decide this question. At all events, so far as concerns this case, Prym believes that it concerned only a very circumscribed carcinomatous polypus, and that probably the special anatomical conditions made the complete removal of the carcinomatous tissue intelligible.

It is not possible to compare these cases to the one related by me. The sections which I examined and had examined,

absolutely do not show the early stages which, according to Ruge and Prym, make a complete eradication by curetting intelligible. It did not concern a carcinomatous degeneration of a polypoid proliferation that was limited to the mucosa, because, as the sections show beyond doubt, the carcinoma had penetrated deeply into the myometrium. What may occur in special anatomical disposition is not conceivable in our case.

For this reason, I express as my belief, that, if no accidental mixup happened with specimens, this is the first case of such a nature that has ever been observed.

As subsequent clinical and pathological examinations showed, the patient is cured not only clinically but also anatomically; and inasmuch as we cannot speak of a spontaneous cure in cancer, we must assume that the carcinomatous structure was removed entirely by curetting, unless an accidental interchange of scrapings occurred.

The patient was last seen in November, 1914, and was then in perfect health, subjectively and objectively.

Since seeing the case reported in the foregoing, I had the opportunity of seeing an instance of *early* adenocarcinoma in a patient in whom no suspicion of cancer was present. The curetting was done in the course of operations for descent of the uterus and vagina. B. McC., thirty-six years of age, descensus of uterus and vagina. The scrapings sent to the laboratory, as is done in nearly every instance. The report showed adenocarcinoma to be present. In view of the extensive plastic operation and the ventral suspension, I hesitated to subject her to the extirpation of the uterus, but the microscopical pictures were so unmistakable that, upon advice, I yielded without doing another curetting for diagnosis. Serial sections from all parts of the uterine mucosa failed to show further evidence of malignancy.

Specimen consists of the uterus removed by total hys-

terectomy with both adnexæ. The mucous membrane of the organ does not show any place macroscopically suspicious of malignancy. The mucosa presents a few circumscribed areas of hyperemia; these congestive and hyperplastic processes seem to be more marked in the tubal corners.

Microscopical Examination. In order to find out any trace of malignant growth, practically the whole mucosa was examined microscopically. Generally speaking, the uterine mucous membrane is somewhat thickened and shows slight hyperplasia of the interstitial cells and some hyperplasia and hypertrophy of the uterine glands, the number of which does not seem to be much increased. In some places the interstitial changes and the hyperplastic changes of the glands are more marked, especially in the tubal corners. But, although in those regions the glands are numerous and show some irregularity in the disposition of the epithelial cells, nothing suggestive of malignancy could be found, the glandular individuality being perfectly maintained everywhere. The myometrium is dense in texture and shows marked new formation of connective tissue with corresponding decrease in the number of the epithelial cells. The walls of the bloodvessels are thickened by new growth of connective tissue, especially in the intima.

Diagnosis: Chronic metritis and endometritis.

Bibliography.

1. Von Heisemann. Deutsche medizinische Wochenschrift, 1913, No. 26.

2. Theilhaber. Zentralblatt für Gynäkologie, p. 355; Deutsche med . Wochensch., 1907, No. 26.

3. Gebhart. Pathologische Anatomie der weiblichen Sexual organs, Berlin, 1899.

4. G. Winter and C. Ruge. Lehrbuch der Gynäkologischen Diagnostik, 3te Auflage, Leipzig, 1907.

5. Schottländer and Kermauner. Zur Kenntniss des Uteruskarzinoms, Berlin, 1912.

6. P. Prym. Vollstaendige Entfernung eines Carcinoma Uteri durch Probeauskratzung, Deutsche medizinische Wochenschrift, 1913, No. 26.

7. Heis. Heilung eines Falles von Carcinoma Uteri nach Probeauskratzung, Deutsche mediz. Wochenschrift, 1913, No. 22.

8. Brettschneider. Beitrag zur Frage der Heilbarkeit des Krebses durch palliative Behandlung, Archiv für Gynäkologie, Band xcii, Heft 1.

9. Fromme. Archiv. für Gynäkologie, Band lxxix, Heft. 1.

10. T. S. Cullen. Cancer of the Uterus.

NEW FACTS AND THEIR CLINICAL SIGNIFICANCE CONCERNING CANCER

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It has been definitely established that the cancer cell arises in certain organs from cells which are normally present, and which have the definite normal function of replacing the functionating cells of the organ.[1] They are the immediate offspring of the germinative cells of the parenchyma of these organs.

It has been further established that parenchymal germinative cells of some organs undergo certain morphologic changes in the presence of chronic irritant or irritants and that these changes are similar in the breast, prostate, skin and stomach. The line of demarcation between the hyperplastic intra-acinic or intraglandular cellular changes and the extra-acinic or extraglandular epithelial cells which are characteristic of carcinoma is not morphologially visible, the only difference being in the location of the cells. Intra-acinic or intraglandular hyperplastic cells have been considered to be non-malignant, and extra-acinic, and extra-glandular hyperplastic epithelial cells to be malignant.

Normal functionating cells, hyperplastic intraglandular and intra-acinic germinative cells and extraglandular and extra-acinic hyperplastic cells of carcinoma are frequently seen in the same field of the microscope.[2]

It has been apparent that the most closely related cytologic picture to carcinoma, is the intra-acinic or intraglandular

hyperplasia which has been termed secondary epithelial hyperplasia and that this picture is the histologic condition which should be called the precarcinomatous or precancerous condition.[3]

In 1913, I[1] described the stages of epithelial hyperplasia as primary, secondary and tertiary, and during the same year presented[4] an application of these terms to the mammary gland.

Since the terminology which I have adopted as a result of this investigation has proved simple and satisfactory in the case of mammary neoplasms, it has seemed advisable to extend the observations to other organs. The prostate, skin and stomach have conformed absolutely to this histology and terminology. Such definitely defined terms as primary, secondary and tertiary epithelial hyperplasia may be utilized in establishing a clearer understanding between the pathologist, clinician and surgeon in clearly defining benign, doubtful and malignant epithelial growths. The proposed method, however, involves the undemonstrated danger of spreading a malignant disease by wide excision, both pathologist and surgeon agreeing that incision of neoplasms is a bad and dangerous practice.

In doubtful cases wide excision of pathologic epithelial conditions produces a specimen which may be classified under three distinct and definite headings, each having a definite clinical significance, and that forming the basis of accurately defining the doubtful group of cases, which may be studied with the object of settling the correct operative procedures and the curative effect of operative surgery in its relation to epithelial neoplasms. It may be suggested, therefore, that such a specimen when removed by wide excision be classified as primary epithelial hyperplasia, secondary hyperplasia or tertiary hyperplasia, the first being benign, the second being doubtful, and the third being malignant. (See diagrams 1, 2, 3, 4, and 5.) With our present knowledge, the first condition requires only excision

if anything, the second wide excision and the third complete or radical removal.

In case the pathologist reports secondary hyperplasia, wide excision only is justifiable. It is this group which needs careful study, because the exact outcome of such a condition can only be accurately determined by the post-operative histories of such cases. This fact puts the problem in a field of research, which belongs to the surgeon and forces him to standardize his operative procedures to histologic findings. Only by such standardization will the clinician, the surgeon and the surgical pathologist be able scientifically to coöperate in their efforts to render justice to the patient.

Bibliography

1. MacCarty, W. C. Histogenesis of Cancer (Carcinoma) of the Breast and its Clinical Significance, Surg., Gyn., and Obst., 1913, xvii, 441–459.

2. McGrath, B. F. Cancer of the Prostate, Jour. Amer. Med. Assoc., 1914, lxiii, 1012–1018.

3. MacCarty, W. C. Precancerous Conditions, Jour. Iowa State Med. Soc., 1914, iv, 1–11.

4. MacCarty, W. C. Clinical Suggestions Based upon a Study of Primary, Secondary (Carcinoma) and Tertiary or Migratory (Carcinoma) Epithelial Hyperplasia in the Breast, Surg., Gyn., and Obst., 1914, xviii, 284–289.

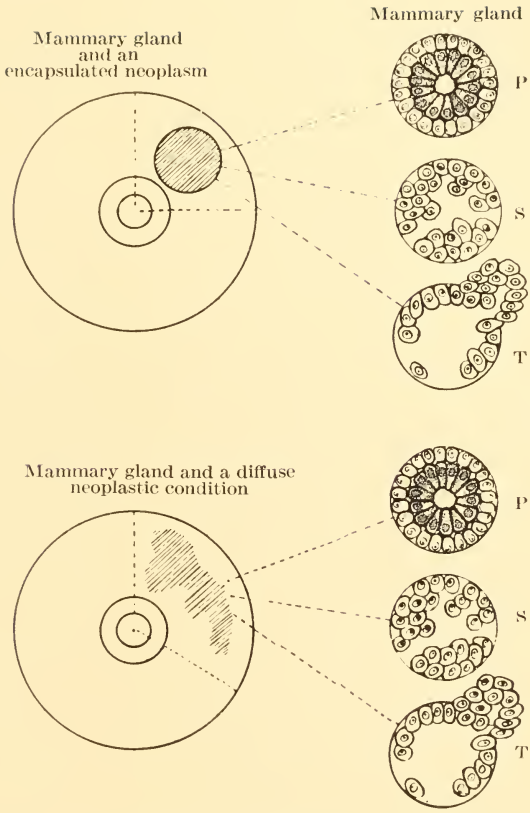


Diagram 1.—Encapsulated and diffuse fibro-epithelial neoplasia showing the histologic pictures of primary (*P*), secondary (*S*), and tertiary (*T*) (carcinoma) epithelial hyperplasia.

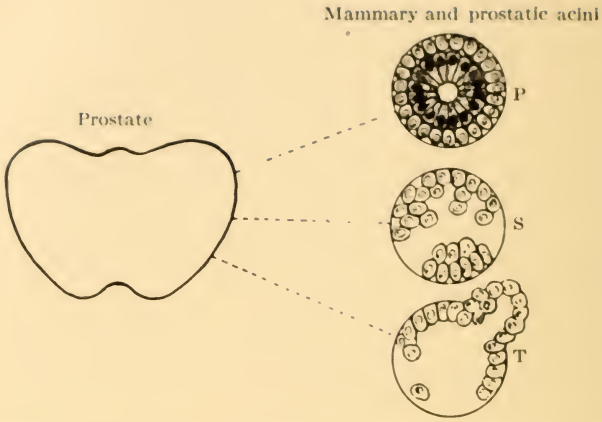


Diagram 2.—The prostatic epithelium presents the same arrangement of cells with the same cytologic characteristics which are found in the breast. *P*, *S*, *T*, primary secondary, and tertiary or migratory hyperplasia.

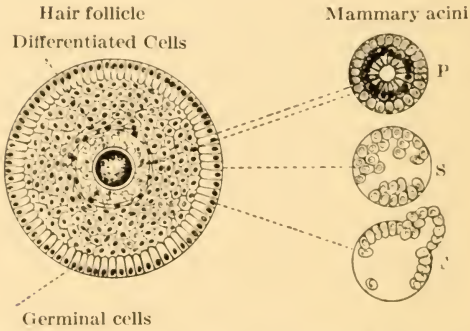
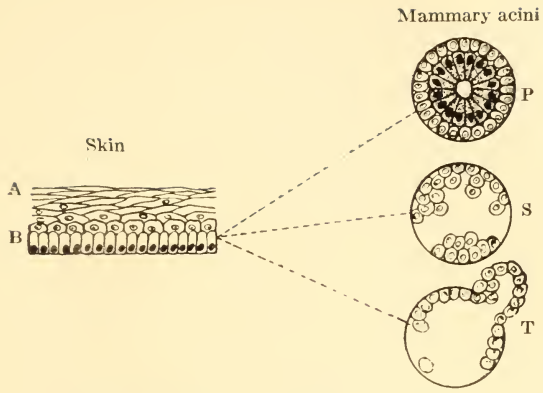


Diagram 3.—The principal cytologic changes which occur in the hair follicle in chronic folliculitis are seen in the germinal cells, which present the same cytologic characteristics which are seen in the mammary acini when undergoing a condition of epithelial hyperplasia. *P*, *S*, *T*, primary, secondary, and tertiary or migratory epithelial hyperplasia.



A, differentiated cells. B, germinal cells.

Diagram 4.—In conditions of chronic dermatitis one finds the most marked cytologic activity in the germinal layer of cells, which present the same cytologic characteristics which are seen in secondary and tertiary epithelial hyperplasia in the acini of the mammary gland. *P, S, T,* primary, secondary, and tertiary or migratory epithelial hyperplasia.

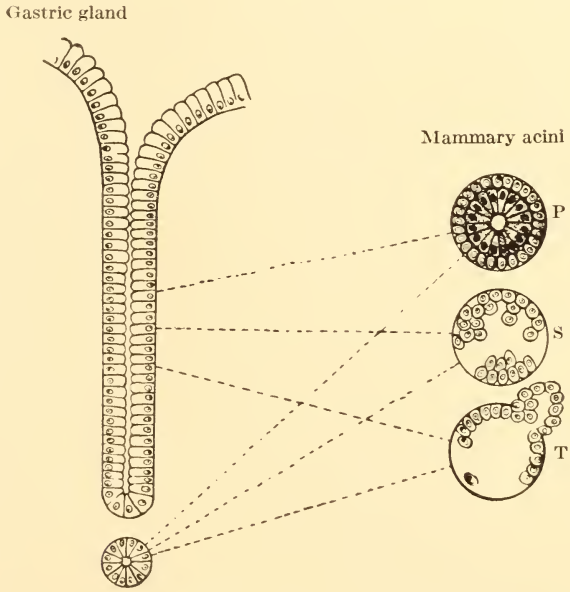


Diagram 5.—The analogy between the observations of epithelial hyperplasia in the breast and those in the stomach. The location of the germinal cells in the gastric gland is at present uncertain. In the gastric gland two rows of cells are not seen as in the prostate, breast, skin and hair follicles. However, where the differentiated columnar or cuboidal gastric epithelial cells are normal, one sees in chronic inflammatory conditions certain cytologic pictures which are analogous to those which are seen in secondary and tertiary epithelial hyperplasia in the breast. *P, S, T,* primary, secondary, and tertiary or migratory epithelial hyperplasia.

PRELIMINARY REPORT ON THE USE OF THE PERCY CAUTERY IN CARCINOMA UTERI, WITH ESPECIAL REFERENCE TO ITS USE AS A FORERUNNER TO THE WERTHEIM OPERATION

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When Byrne, of Brooklyn, in 1892 published his epoch-making paper on the actual cautery in cervical carcinoma, he produced a profound impression upon the surgical world. Since his article, many have tried to emulate the brilliant success he achieved, but none have been able to even approach his results. This, I believe, was primarily due to there being no concerted plan of action, each operator worked on independent and different lines of thought. There was no one recognized technical plan to follow, the scientific conception and purpose was hazy, and cauterization, accompanied with curetting, was done in a desultory and indifferent manner, all of which terminated in disappointing results.

Such was my unsettled state when Percy, of Galesburg, Ill., gave to the profession, in 1912, a clearly worked-out scheme by which heat could be applied on a far more elaborate basis than ever before. He worked out a superb technical plan; his methods of protecting the vaginal canal with the water-cooled speculum, of controlling the degree of diffused heat by a hand within the abdominal cavity, as

well as the electric cautery, with its wonderful possibilities, were at once attractive.

He further ably presented the underlying basic principle, which after all is the crux of the treatment, wherein the hot iron disseminates the heat wide of the site of the disease, thus raising the temperature of the surrounding tissues to a point at which cancer cells are destroyed and normal cells unaffected. Experimentation shows that cancer cells are peculiarly susceptible to heat and are killed if raised to a temperature of 122° to 131.9°, whereas normal cells are not changed until the temperature exceeds 131° to 140°. (Percy.)

When we first employed this method it was primarily in the inoperable or surgically abandoned cases, and used, as did Percy, the soldering irons. The temporary results in these cases were at once striking. The hemorrhage would cease and with the detachment of the slough went the stench. As the source of toxemia was eliminated, the appetite improved, pain greatly diminished, and from a desiccated, cadaverous-looking individual, many of these cases were so notably transformed, that it was depressing to realize that these women were only temporarily restored. Beyond a doubt, these cases are given a comfortable extension on life. A certain percentage of these cases of the advanced type were converted into the operable, as evidenced in two cases, who when first seen dispelled all thought of operability, but after a series of application of heat, the uterus became movable, there was no appreciable lateral infiltration, and as an operative risk they were transformed to such a degree that Wertheim's removal was performed, and much to our surprise, after repeated serial sections and most careful search, no cancer cells could be found in either specimen.

There are now two cases in my hospital service, one of whom has had five hot-iron applications, with one abdominal opening, and the other three treatments, with two abdominal openings. They have constitutionally and locally mar-

velously improved, and though they were considered beyond all surgical hope, if this progressive improvement continues, it is believed that a radical operation may be done.

Long since, pathologists have taught us that one cannot foretell by the macroscopic appearance of a cervical cancer just to what extent it has metastasized, therefore I am giving, with Percy's method, practically every case a chance. Bonney, of London, was telling me this past summer that the pathologist of the Cancer Hospital of London had performed autopsies on one hundred cases dying of cancer of the uterus and found that 46 per cent. of these cases did not have their lymphatics involved beyond the pelvis, and from a viewpoint of lymphatic invasion were curable from an operative standpoint. This is a startling observation and even though we accept it as only partially true, it gives a reasonable basis for a cure in some advanced cases and further accounts for the sporadic cures nearly every man has had in the use of the old zinc chloride paste.

In the borderline operative cases the application of this extensive heat has a most gratifying result, making many operable that otherwise would have been declined. Whenever there is a definite ulceration with bleeding, having as a rule as associated local infection with slight infiltration, the Percy cautery should be employed as a preliminary measure, since it not only acts in destroying the infection, but stops bleeding and toxemia, and the case will in three weeks be a far better surgical risk than when first seen. To properly apply the heat it takes fully thirty minutes in the simpler cases and sometimes as high as fifty minutes in the advanced ones, therefore it is not well to add to this, an additional hour and a half to two hours manipulation in performing the radical, but rather it is better to divide it into two sittings. The method occupies an unique position in converting the inoperable cases into safely operable ones.

Whereas the heating iron is a valuable adjunct in the effort to destroy cancer process, I have always felt that the

radical removal along the lines devised by Clark, Reis, Werder and Wertheim enabled one to get wider of the involved area than the heat possibly could radiate, therefore believe that in the judicious combination of the two plans, a greater percentage of permanent cures will be realized.

In the earliest type of cervical carcinoma, where the patient is a good risk, it seems to me that we should use the heat as a preliminary. The abdomen should be first opened, the cautery introduced within the cervix and the hand within telling when the heat gets to the point where it can barely be tolerated, and if this heat is maintained for ten to twenty minutes, all cancer cells so influenced will perish and then when the abdomen is invaded immediately after, we rid the operation of the danger of grafting cancer cells, at any rate those cells near the uterus and within the vault of the vagina. This is the plan I have more recently adopted, and since this extra twenty minutes does not overtax a good risk, the radical operation immediately follows the cauterization. Every effort is being made to closely follow these cases and later I hope to report the end-results, feeling that some instruction will accrue from comparison in cases so treated with those not heated.

This report is purely a preliminary one since the work is not two years old, the bulk of this material has been in the past year, and to discuss such premature results would be folly. However, even though the work is in its infancy, since our results at the present time have been so encouraging and, further, since it is possible that we may offer some new idea as to the further scope of the method, it is presented, trusting that others may be stimulated along similar lines.

As others work along the Percy plan, the originator will naturally be encouraged, and certain refinements of the method will follow. It was with this viewpoint that my clinic took up this investigation.

We have had in all only twenty-five cases, but have done

more in the past seven months than in the preceding one and a half years. From these few cases we have in point of technique closely followed Percy's teachings. In the first cases the copper irons were used; they being plunged into the mass, from which would roll huge clouds of smoke. This was before we appreciated that the real idea was to heat and not to carbonize, thus causing the operating room to be filled with fumes of charred flesh. The electric heating iron replaced the copper and with it came the greatest joy. This electrically-heated iron is perfect; it can be kept at a constant low or high heat, and one is freed of the worry of constantly changing irons. If nothing else comes of this elaborated heat method, this electric cautery will in itself stand for all times. We never curette, but throughout use heat. The low-grade, simmering heat, free from charring and smoke, leaving behind a sickly yellow color to the immediately surrounding tissues, is that which is to be desired. To carbonize the parts is to be avoided, since carbon is a bad conductor of heat, and the essential point desired is a wide distribution of heat as far out from the involved field as possible. In the extensive, proliferating, external type of carcinoma, it is best to use the cutting blade of the cautery, as a knife for amputation, for here to completely destroy the external growth so as to get within the uterus would take an interminable time. Another point in Percy's plan from which we vary is in not routinely opening the abdomen at every heat sitting. In a case having a large, fungating, sloughing mass, this is first destroyed without section; then after the original growth has shriveled and the general condition improved, in about three weeks later at the second sitting, the abdomen is opened and the heat applied high up within the uterus, having the hand as a guide to the location of the cautery, as well as the degree of heat.

Two hemorrhages occurred in my cases, one of which ended fatally. This was in a very advanced and hopeless

case from the viewpoint of cure. The nurse saw her at 1 A.M., when she was well, and at 5 A.M. was found dead, having had a profuse hemorrhage. The other case was easily controlled by packing. I have been contemplating the ligation of both uterine arteries[1] and one ovarian as a prophylactic against hemorrhage, and secondly expect to see as a result of the diminished blood supply a retarding influence follow the starvation. This in certain cases should be easily done by incising the peritoneum on the posterior surface of the broad ligaments just above each ureter and then running the finger down along its course to the artery in front, when with an aneurysm needle both uterines could be ligated at a distance from the ureters. As a result of the liberal anastomosis it seems that one ovarian would be sufficient to maintain nutrition.

Two vesicovaginal fistulas followed the use of the method. In one of these cases, when I went in from above to cure the fistula, which was high up, a radical removal was done, and this is one of the uteri in which I was unable to find any cancer cells. The other fistula case was so involved with cancer that it was impossible to restore, and though temporarily improved constitutionally, is now hopeless and will live only a few more months.

Only in the past week, I heated a perfectly operable cervical carcinoma in a heavy, short-necked, chubby, obese woman, in which it was out of the question to attempt a radical, but in which it was perfectly safe to make an incision to introduce the hand as a guide to the hot iron. In this type of case this method offers hope and is the only one that could be safely employed.

In point of specula, we have devised some slight modification of Percy's originals. In large, fungating growths it

[1] Since reading this paper, I have tied one internal iliac and two ovarians, and this case seems to have cleared up more rapidly than the others. While in the abdomen for controlling heat, I next contemplate tying both internal iliacs.

is impossible to bring the mass in the field, so found that in dividing the cylindrical speculum, converting it into two parts, each having a handle, that this obstacle was overcome. Another speculum we have, is one a little longer than the original, besides being slightly conical, differs further in having a small projection on its posterior margin, which keeps the vaginal wall from rolling around its end, thus freeing one from the annoyance and dread of burning the bulging rectovaginal wall.

Finally, as yet no true end-results can be deducted from my cases, but from the temporary results so far obtained, we feel encouraged and believe that in Percy's elaborate heat method a definite advance has been made in het treatment of cervical carcinoma, and not only is it a most valuable agent in managing advanced carcinoma, but when combined with the extensive removal of the uterus, our percentage of permanent cures will be, as we hope to show in subsequent report, definitely improved.

DISCUSSION ON THE PAPERS OF DRS. BOLDT, MacCARTY, AND CLARK.

Dr. A. C. Scott, Temple, Texas.—The paper of Dr. Clark is one that comes close to my heart, because I have given a good deal of study to this subject in the last two or three years. I regret the paper I prepared for the Texas State Medical Association and read at Amarillo, was not published, because I discussed in that paper a number of these features of the treatment of cancer with special reference to the *x*-ray phase.

Last year I presented before this body a paper along these lines in which I endeavored to lay special stress upon the use of the cautery in handling inoperable cancer or cancer that was found in difficult cases. Some of you will perhaps remember that paper. I made use of a combined position which I described before you a year or two ago. This feature the doctor mentions in his paper, with reference to placing his hand in the abdomen while applying the cautery, is one I especially referred to, and

if you will look in the TRANSACTIONS for last year you will find I have a drawing illustrating the cautery in the uterus while the hand of an assistant is on the abdomen guiding the operator.

There are many things about it that may be said, but I wish to call attention to the one fact which I mentioned in that paper, and that is, our investigation shows that after the removal of certain cancerous masses, where we have gone wide of the cancerous area, and in places we burned into the cancerous mass, the heat had destroyed the cancer cells to an unrecognizable degree out as far as half an inch beyond the charred surface.

We have been making some further observations along this line since the last meeting, and we find that the depth to which the cells are damaged by the heat depends very largely upon the degree of heat applied and the time given to it. If we burn rapidly we do not destroy the cancer cells beyond the charred point. On the other hand, if we burn slowly, using the cautery, whether it is the electric or Paquelin cautery, or the common soldering iron, the heat destroys the disease. If we use a dark red heat we destroy the cells beyond a greater distance.

I do not wish to discuss the subject further other than to say, I feel that we are fighting cancer to the best of our ability, but still we are groping in the dark. While I cannot back up that statement by scientific investigation, I wish to say that I have a firm conviction, cancers are of parasitic origin, and that whenever we can get ourselves to the point of destroying all disease inside and getting well beyond it, we can then afford to wait for things to clear up and for the remaining parasites to die out before we do the more radical work.

DR. J. SHELTON HORSLEY, Richmond, Virginia.—Dr. MacCarthy has clarified the situation in regard to glandular, or adeno-carcinoma, but I cannot quite see how it applies to carcinoma of the skin. I would like to ask how he interprets spindle cell carcinoma of the skin? I can see very well how his explanation applies to the basal cell type of carcinoma.

DR. GEORGE W. CRILE, Cleveland, Ohio.—I have been very much interested in Dr. Clark's paper, and I wish to say that for a long time we have made the two-stage operation in cancer of the cervix to prevent implanation in the field. We have used this in cervical cancer as well as cancer of the mouth. I am using the Percy method, and I have been very much interested in what Dr. Clark has said concerning it.

Dr. Thomas S. Cullen, Baltimore.—When operating on a superficial cancer of the labium I use the cautery as a knife. The cancer, with as wide an area of healthy tissue as possible, is thus cut away, and then with a knife I remove all the area burned by the cautery. The margins of the wound are now approximated by sutures. In this manner the possibility of transplantation of cancer cells is reduced to a minimum.

I was much interested in Dr. MacCarthy's paper, and in fact, in the various papers which he has given us on the subject of cancer.

We have seen some very early cancers of the uterus. The smallest was shown in Fig. 184, page 295, in the volume Dr. Kelly and I published on *Uterine Myomata*. The growth was accidentally discovered during our routine examination of the uterine mucosa in cases where myomata existed. The cancer was no longer than a pin head and as it scarcely projected from the surface of the mucosa it could not have been recognized macroscopically. A glance at the section showed the characteristic picture of adenocarcinoma—so typical that there was absolutely no question as to its malignancy. In cancer of the body of the uterus we rely on two factors for diagnosis: The gland pattern and the cell changes. In some cases the pattern is definite and typical cell changes lacking. In others both the pattern and cell changes leave no doubt as to the existence of cancer.

Squamous-cell carcinoma of the cervix is much commoner than adenocarcinoma of the cervix. The flat-celled growth also forms much larger papillary or cauliflower-like growths. The adenocarcinoma sometimes develops in the cervical canal and little can be detected on vaginal examination and yet on histological examination the entire cervix is literally riddled by glands.

Adenocarcinoma of the cervix offers the poorest prognosis of any variety of uterine cancer. Dr. J. Craig Neel, resident gynecologist of the Johns Hopkins Hospital, tells me that of all the adenocarcinomata of the cervix operated upon in this institution only one is alive today. I operated upon this patient two years ago. The length of time since operation is so short that we cannot with any certainty say that this patient has been cured.

Dr. Boldt's case has been of the greatest interest to us in Baltimore. It has led the surgeon who made the first curettage to look over the literature and he is preparing a paper on

the subject. Dr. Welch and I have both read the paper. Some of the cases in which cancer is said to have been removed by the curette are rather hazy. There are a few cases, however, in which the cancer was apparently entirely removed by the curette. The surgeon referred to the case of Mrs. L. who had a cancer of the body of the uterus. The tissue he removed would fill a wine glass.

On opening the uterus the cavity on the whole appeared normal but at one point was a pedicle or short stalk. The carcinoma in this case was evidently tree-like and attached to the mucosa by one small pedicle.

The author of the paper after his review of the literature and the findings in this case came to the conclusion that this was what we might term a pedunculated adenocarcinoma of the body of the uterus and must be relatively common. If it were so, then we in a careful routine examination of all the material coming from the Gynecological operating room at the Johns Hopkins Hospital for a period of over twenty-one years, should at least occasionally have met with such a condition. We have never had a case of this character in the institution, nor have I ever encountered such a case in my private practice.

Quite recently, however, Dr. Elizabeth Hurdon, who is associated with me in the laboratory, removed a wine glass full of curettings from the body of the uterus in a patient in the Woman's Hospital of Baltimore. These curettings revealed a typical adenocarcinoma of the body of the uterus. Fig. 1 is a schematic representation of the appearance of the uterus before and after removal. The uterine cavity as a whole shows little change, but at one point is a short and rather thick pedicle. Section after section through this pedicle failed to show any evidence of cancer. This was the only currettage done at the hospital that day and Dr. Hurdon herself took the specimen over to the laboratory, consequently there was absolutely no chance of the curettings being accidentally exchanged for another specimen. In this case the cancer was undoubtedly entirely removed by the curette.

That cancer of the body of the uterus may in some instances be entirely removed by the curette seems certain—so rarely, however, that these cases are from a clinical stand-point a negligible quantity.

It would be unfortunate if the profession of the country should gain the impression that cancer of the body of the uterus could

be removed by the curette. Many patients would naturally prefer a curettage to a complete hysterectomy and as a result of the vast majority of these patients would die of the disease. Whenever cancer of the body of the uterus is diagnosed hysterectomy should immediately be performed.

With the permission of the President I shall include in my discussion a full report of Dr. Hurdon's case. This she kindly furnished me for this meeting. I will also append another case, the scrapings of which Dr. Hurdon examined for Dr. Martin B. Tinker, of Ithaca, New York. In this case nearly all of the cancer was removed by the curette.

I was deeply interested in Dr. Clark's results with the Percy method. We have been using the ordinary soldering irons and even after the use of these we have frequently been amazed to see how the growth will contract, and that a case that was fixed and apparently too far advanced for operation can now be removed.

I have been strongly impressed with the fact that if a cervix is cauterized today, for instance, and a hyterectomy done three or four days later, that this patient will do badly. These patients do not seem to stand two anesthestics in one week at all well. After the cauterization I think it wise to delay at least ten days to two weeks before undertaking the radical operation.

Almost Complete Removal of an Early Carcinoma of the Body of the Uterus by the Curette. (Dr. Elizabeth Hurdon.)

Miss X., aged fifty-four years; patient of Dr. Tinker, September, 1914. Complained of uterine hemorrhage. A moderate amount of curettings was sent for diagnosis histologically. The fragments of tissue for the most part showed a simple hyperplasia of the endometrium. In one or two places, however, the glands were atypically crowded together, their epithelial lining in two or more layers and the epithelial cells larger than normal and atypically stained. Some of the gland lumina were completely filled with the proliferating epithelium.

Diagnosis. Early adenocarcinoma of the body of the uterus.

Hysterectomy was performed about six weeks later. The uterus was not enlarged and contained a small interstitial myoma about 2 cm. in diameter. The uterine cavity was of normal size. The mucous membrane showed nothing abnormal with the exception of a small area near the fundus where the mucosa, over an area about 8 mm. in diameter projected slightly,

1 or 1.5 mm., above the surrounding surface, and on section was found to dip down and displace the underlying muscle to a depth of about 3 or 4 mm.

Histologically, with the exception of the thickened area, the mucosa showed nothing abnormal. At this point, replacing the normal mucosa and invading the musculature, were closely packed irregular glands lined with multiple layers of atypical epithelium.

Diagnosis. Adenocarcinoma limited to an area 8 mm. in diameter and scarcely elevated above the surface.

Conclusion. The diagnosis from curettings was practically an accidental find and if the patient had been curetted again a few weeks later the small area of carcinoma in the upper portion of the uterine cavity might easily have been missed and the original diagnosis questioned.

Adenocarcinoma of the Uterus Entirely Removed by the Curette. (Dr. Elizabeth Hurdon.)

Mrs. H., admitted April 20, 1914, complaining of constant uterine hemorrhage. The patient was fifty years old, had had one child and two or three miscarriages. Two or three years before her menses, which had previously been regular, became less frequent and less profuse. A few months before admission she began to have a constant bloody discharge, usually scant but occasionally amounting to a rather severe hemorrhage. There was slight pain in the lower abdomen. On vaginal examination the cervix was found at the outlet. The portio vaginalis was smooth and the os small. The body of the uterus was retroposed, slightly enlarged and boggy. The patient was exceedingly fat; blood-pressure 170. Urine contained albumin and casts. On curetting a large amount of material was removed, consisting of large pieces of granular, semi-translucent tissue. Histologically the tissue for the most part consisted of papillary masses, each delicate papilla consisting of a thin-walled bloodvessel surrounded by a very small amount of stroma with a covering of two or more layers of epithelium. Other pieces of tissue showed a more rounded surface covered with many layers of epithelium. The underlying tissue is almost entirely composed of irregular branching anastomosing glands separated by a very scant vascular stroma, slightly infiltrated with small, round cells. The epithelial cells are high, cylindrical, and contain vesicular nuclei. Mitotic figures, both symmetrical and asymmetrical, are very numerous.

Diagnosis. Adenocarcinoma of the uterus.

Vaginal hysterectomy ten days later. The uterus was practically normal in size and apart from a small subperitoneal myoma in the anterior wall, which was shelled out, showed nothing abnormal externally. On section the cavity of the uterus was of normal size and everywhere lined by smooth mucous membrane averaging 1 mm. in thickness, with the exception of an area in the upper portion of the posterior wall, where there was found an irregular elevation, about 1 cm. in diameter at its base, which had a ragged surface partially covered by a blood clot. This resembled the pedicle of a polyp. Histologically the endometrium as a whole is practically normal. The glands are small, not increased in number and lined with a single layer of epithelium. The surface of the elevation consists of granulation tissue covered with blood and fibrin. In the underlying tissue the glands are considerably dilated and a few slightly branched, but otherwise practically normal. The stroma contains dilated bloodvessels and is moderately infiltrated with round cells. The muscular coats are normal. There is no evidence of carcinoma.

Conclusions. The typical adenocarcinoma of the uterus found in the curettings was probably a polyp which had undergone carcinomatous changes or may have been carcinoma developing in the form of a polyp. The curettings consisted entirely of carcinomatous tissue, no trace of the usual structure of a uterine polyp being found.

Dr. Reuben Peterson, Ann Arbor, Michigan.—I can corroborate what Dr. Clark has said in reference to the good results of the Percy cautery treatment of carcinoma of the uterus. I have been using this method for the past two years with the most gratifying results. Not only is it the best treatment for far-advanced cases of uterine cancer, but in the borderline cases it has enabled me subsequently to make use of the radical operation. I am doubtful about the claims of Dr. Percy that glandular carcinoma will be cured by this method. Time alone can prove or disprove this, but aside from whether the method will or will not accomplish this, it will work wonders in these terrible inoperable cases of carcinoma of the uterus.

Dr. MacCarty (closing the discussion on his part).—Mr. President may I have the privilege of discussing Dr. Boldt's paper?

The President.—Yes.

Dr. MacCarty.—I think we must recognize that carcinoma is a question of cytology and for that reason the diagnosis may be made upon small pieces which have been removed by a curette. This fact also permits the possibility of a cure by curetting if one removes all of the cells.

In regard to curetting a uterus for the purpose of making a diagnosis, I should like to ask the surgeons the difference between curetting a carcinomatous uterus and an epithelioma of the skin or a carcinoma of the breast. This question involves a principle, although there are doubtless clinical reasons for curetting a uterus rather than removing it for examination, since the later procedure would be very radical and possibly be the cause of many unnecessary hysterectomies.

With reference to Dr. Clark's paper upon the use of the Percy cautery, it may be well to state in its support that I have had occasion to examine a number of uteri before and after the use of the cautery. In some cases I have been unable to discover any traces of the neoplasm after such procedure.

In regard to Dr. Horsley's question, I may state that certain facts which have been recently discovered led me to believe that many of the old classifications of neoplasmata will have to be abandoned.

The three-layer stage of embryonic development will doubtless have to give way to the fact that the endoblastic and mesoblastic layers are themselves immediate derivatives of the ectoblastic layer. This fact may furnish a new basis of classification which will replace to a large extent much of the whole terminology of tumors. For example, such terms as medullary and scirrhous doubtless will disappear, because they are gross terms expressing conditions which exist often together in the same microscopic field.

Experience is rapidly teaching me that cancer cells are frequently morphologically identical, although from different sources. Tumor cells are products of the germinative cells of organs and are not metaplastic cells of the specific functionating cells of organs. When placed under favorable circumstances in other tissues, in the form of metastases, the cells may and apparently do attempt to become differentiated into cells resembling the normal specific functionating cell of the original organ. In this manner the metastatic cells not infrequently somewhat resemble the original organ, although the speaker has never seen complete differentiation of cancer cells into the parenchymal cells of the organ from which they originally came.

Partial differentiation has been responsible for the presence of so-called different types of epithelial neoplasmata such as basal-cell and spindle-cell epithelioma. The malignancy of these types is still in doubt.

I was greatly impressed by Dr. Coley's remarks yesterday when he used the simple term "cancer" in speaking of testicular tumors. This seemed to indicate some dissatisfaction with the present classifications and emphasizes the dissatisfaction which I tried to portray in my work upon *The Histogenesis of Cancer of the Breast.*

Dr. Boldt (closing the discussion on his part).—I have been extremely interested in Dr. MacCarty's remarks, and personally I wish to thank him for them.

With regard to the picture or photograph shown by Dr. Cullen, from a clinical point of view the cure of that case is readily understandable. It is a pedunculated carcinoma. I mentioned pedunculated carcinoma and the polypoid forms of carcinoma, and it is readily understandable how they can be cured by curetting. The instance I spoke of is a different type.

I would like to say a word with regard to Dr. Clark's paper. Dr. Percy was good enough to demonstrate his method of operating in one of the hospitals with which I am connected, and I have since made use of his cautery method. But I would like to call attention to the cauterization work done by our late colleague, Dr. Byrne, who demonstrated, I think, to the satisfaction of everyone that a number of these cases are absolutely cured by the galvanocautery. I have used the galvanocautery for many years, and the burning of the vagina I overcome also by the use of a water-cooled speculum which I devised a great many years ago, and at the present time I am not satisfied that the slow process of heat by the Percy method is really of more clinical value than the cautery which we have been accustomed to use. It may be that I will form a different opinion later on when I have had more experience.

I have had opportunity of seeing a number of patients brought to the period of comfort for several years before they finally died. Byrne has asserted that he cured a large number of patients with carcinoma of the cervix. Of course, this method of treatment is to be used in these inoperable cases. I certainly would not think for a moment of using it on a patient where we could do a satisfactory radical operation.

In doing a radical operation, I am firmly convinced that it is

in the interest of the patient to resort to spinal anesthesia with novocain rather than to general inhalation anesthesia. I am quite sure that, at least, two patients I was fortunate enough to bring through would have succumbed under inhalation anesthesia, because of the duration of the anesthesia and the shock of the operation.

I feel at the present time that we are not as yet in a position to decide definitely whether slow heat is superior to the galvano-cautery as we have been accustomed to use it, and as I generally do in the course of four or five weeks, or three or four months, repeat the heat and see how the patients get along. In this way I have been able to get them into a comfortable condition. It is not to be used any more than any other method or radical operation in patients too far advanced with cancer. There are some patients who have malignant disease to such a degree that it almost penetrates into the rectum and bladder, and in some cases it breaks through the bladder. When the disease is so far advanced in the pelvic organs this or any other form of treatment must be used with the utmost care.

As to the use of radium, I saw some time ago a satisfactory result, although the results are not permanent in any of these cases, in my experience.

Dr. Clark (closing the discussion).—This is a preliminary report of what we are trying to do. It is only in the last six or eight months we have gotten the thing going, and I hope in the next few years to give you something worth while. This method is an improvement over the old, and is the reason why we have taken it up.

In reference to the remarks made by Dr. Scott, I may not have given credit to all, but I have followed the Percy idea; since he was the one who gave the plan, I did not mention any one else.

In reference to Dr. Boldt's paper, I would like to know whether he has ever employed hysterotomy in some of these obscure cases of uterine bleeding. Dr. William Russell, of Baltimore, first called our attention to the value of hysterotomy. I remember very well a case I had referred to me with a definite diagnosis of carcinoma of the body of the uterus, the claim being made by the pathologist that cancer cells had been found from previous scrapings.

At the time of operation, I could find no evidence of cancer, but felt a mass in the left adnexal region, so opened the abdomen

and found an ectopic. I then performed a hysterotomy, thoroughly explored the endometrium and found it perfectly normal. It was only by such a procedure that I could have been positive the uterus was innocent. Hysterotomy is unquestionably a most valuable step in selected cases and especially enables us to live within the bounds of pathological teaching in reference to cancer.

HEMANGIO-ENDOTHELIO-BLASTOMA OF THE STOMACH

By J. Garland Sherrill, M.D., and F. S. Graves, M.D.
Louisville, Kentucky

Tumors of the stomach are not common. A hemangioma of the stomach is exceedingly rare. The report of this case is of interest and seems justified by the fact that very few similar cases have ever been placed on record. The clinical aspect of the case is submitted by Dr. Sherrill and the pathological findings are presented by Dr. Graves.

Mrs. ——, white, thirty-one years of age, came to me in the fall of 1907. Family history negative, with the exception of one sister upon whom I had just operated for carcinoma of the cervix uteri. The patient's husband had acquired syphilis prior to his marriage, but had taken vigorous treatment for three years and was apparently in good health.

Personal History. She was the mother of one child and had had two miscarriages. Some time prior to consulting me she fell, striking her epigastrium against the corner of a table. Soon after this she began to complain of loss of appetite, nausea, symptoms of indigestion and epigastric discomfort. These attacks occurred more especially at night, when she would have regurgitation of food, with eructations of salty stuff. Once or twice she vomited blood. She had more or less constant pain in the abdomen which was sometimes relieved by eating. Oftentimes could not go to sleep at night until she had taken a cracker and

some milk. She developed marked anemia, lost flesh, and presented a peculiar cachexia.

When examined at this time she was tender over the region of the stomach and a palpable thickening could be felt in the epigastrium. This mass moved up and down with respiration. At times it could not be felt. Blood examination at this time was negative to malaria, 3,500,000 red cells; 7000 leukocytes, no differential count being made; hemoglobin, 30 per cent. She was given a test meal, but the stomach was empty thirty minutes afterward, therefore the examination was not satisfactory.

Diagnosis of gastric ulcer was made and patient was sent to the hospital with a view to bringing her into condition for operation, if relief did not follow treatment. Rest in bed, carefully selected diet and treatment of the ulcer brought prompt improvement. Subsequently this improvement seemed to be hastened by antisyphilitic treatment.

She came under observation once or twice during the next five years, but was at no time under my constant supervision. Her condition remained fair, but the mass persisted, sometimes palpable, sometimes not; always following the respiratory movements and also quite freely movable. When she consulted me October 4, 1914, the mass had reached almost the size of a kidney and had the wide range of motility seen in floating kidney. This was so marked that there was some doubt expressed as to the attachment of the growth. It was so readily pushed into the right loin that a strong suspicion of movable right kidney existed. It was carried almost, but not quite, as far to the left side at times as to the right. Careful examination of the right kidney, enabled us to feel this organ normally placed. Over the growth slight dulness was elicited on percussion, while tympany was obtained both above and below. Her digestive disturbance when she last presented was not marked, consisting of soreness in the epigastrium, with some eructations and sensation of fulness. Her husband informed me

that about two years ago she had an attack at night, when she felt weak, yawning, with impaired vision and a slow feeble pulse, which he took to be the signs of internal hemorrhage. Within thirty-six hours the stools were black and blood was detected in them. Her anemia improved at times and then recurred. The lump in the abdomen seemed to enlarge and was more tender at her menstrual periods. Wassermann test negative. Blood examination: hemoglobin, 50 per cent.; red cells, 4,500,000; leukocytes, 6000; large lymphocytes, 8 per cent., small, 16 per cent.; polymorphonuclears, 72 per cent.; eosinophiles, 3 per cent., and myelocytes 1 per cent.

Diagnosis. Gastric ulcer with a growth, probably a tumor, although the possibility of a floating kidney was considered.

On opening the abdomen on October 5, 1914, a reniform mass growing from the greater curvature of the stomach near the pylorus and covered by the greater omentum presented to view. This mass was mottled purplish in color and had a rather broad attachment to the stomach. It moved freely with that organ, having no other attachments. A small glandular enlargement was found in the omentum near the base of the tumor. A portion of the stomach about 4 inches in length along the convex border and 2½ inches along the concave border was removed, together with the mass and a portion of the upper part of the duodenum including the pylorus, and the gastroduodenostomy was completed in the usual manner. It was smooth on the surface, somewhat firm near its attachment to the stomach, without induration, and soft in consistency along its distal portion.

Upon examining the growth after its removal, three small openings in the mucous membrane were noted, one of which extended entirely through the gastric wall and communicated directly with the inside of the growth. Through this opening the little finger could readily be passed. The

centre of the growth seemed to be broken down but contained only delicate tissue and no appreciable fluid. It has not been my experience to find a condition of this kind existing with gastric ulcer. I have on several occasions found the adjacent stomach wall markedly thickened and indurated, the induration even extending as far as the liver in one case, but have never found a distinct tumor growing out from the stomach wall with its attachment at the site of an ulcer. There was a strong suspicion that this might prove to be a syphilitic growth, but this was disproven by pathologic examination.

A feature of great interest in connection with the case is the relation between the injury suffered by the patient and the development both of the ulcer and of the tumor. Traumatism has been known to play a very important role in the development of gastric ulcer, especially those that have been produced experimentally. Traumatism is also a known factor in the development of certain forms of neoplasm. Unfortunately it is not possible to state positively whether the growth preceded the ulcer or was a subsequent development to the latter. From the history obtainable I am inclined to believe that the ulcer occurred first; certainly it was present before the patient came under my care.

Another rather interesting feature in connection with the case is the length of time that this condition existed, and it perhaps would have some bearing upon the prognosis. We would scarcely expect a malignant growth to last for six or seven years without having advanced to greater size, and this would lead us to the conclusion that the growth is of a benign nature, which agrees with the view expressed by Mallory.

Since the operation, the patient has improved and states that she feels wonderful relief, eats everything without inconvenience. She is improving in color and there has been some increase in weight. An *x*-ray examination shows

bismuth passed out of the stomach in the usual time. There is slight but not material irregularity at the line of suture, which could scarcely be made out in the skiagram.

The pathological report by Dr. Graves is as follows:

"Specimen consists of pylorus with adjacent portions of stomach and duodenum, the piece of gastro-intestinal tract measuring 10 cm. in greatest length. In the mucous membrane of the stomach, about 2 cm. from the pylorus, are three small holes, largest 2 x 5 mm., with sloping sides and slightly thickened edges. This lies directly over a mass, ovoidal in form, 7 cm. in greatest diameter, soft, covered with a glistening serous membrane with one adhesion between the tumor mass and the external surface of the gut. The mass varies in color from pinkish gray to dark purple in spots. On section cut surface is moist, glistening, soft, homogeneous and, in the two-thirds adjacent to the cut, is pinkish gray with scattered spots of very dark red. The farther one-third is uneven, broken down and dark red.

"Microscopic Description: Different sections show that the tumor consists chiefly of more or less spindle-shaped cells with round or oval, rather faintly-staining nuclei. Their cytoplasm is nongranular and they do not have fibroglia fibrils. The cells in places are closely packed in masses. In other places they are arranged in strands or concentric whorling bundles separated by fibrous stroma. In some regions the tumor cells surround spaces containing erythrocytes. These lining cells are one or more layers thick and in them an occasional mitosis is seen. Some of these vascular spaces are fairly large, but most are small. This picture is varied by areas in which lumena containing erythrocytes occupy the greater portion of the field and are separated only by single strands of endothelial cells. A few of the vascular spaces are extensive, although lined with only a single layer of flat cells. The tumor is sharply circumscribed and is surmounted by gastric mucous membrane.

"Diagnosis. Hemangio-endothelio-blastoma."

Mallory (in the *Principles of Pathologic Histology*, p. 370), on this subject, says: "They are often congenital and frequently, perhaps always, arise from abnormalities of the bloodvessels, especially from vascular nevi. They occur most often in the skin and subcutaneous tissue, but may originate also in muscles, nerves, the liver, spleen, brain, bone marrow, etc. They are to be regarded on the whole as benign growths, although locally destructive because their manner of extension is by infiltration of surrounding tissues and by growths within and along bloodvessels. Apparently but one case of metastasis is on record."

The following reports have been found in the literature:

Robert T. Morris, in a report upon "The Effect of *x*-ray Treatment in a Case of Endothelioma of the Stomach," *Medical Record*, April 16, 1910, p. 683, says: "That some months ago he did a posterior gastro-enterostomy to relieve pyloric obstruction in a case of supposed epithelioma. The growth was so extensive in character that a radical operation was deemed inadvisable, but a section was removed and submitted to Dr. Aspinwall Judd, who pronounced it an endothelioma. Under *x*-ray treatment, the growth had apparently disappeared entirely; the patient had gained about 50 pounds in weight and was now practically well, but may have a recurrence. Epitheliomata and endotheliomata, Dr. Morris says, simulated each other so closely that they are not to be distinguished except by the aid of the microscope, and if of the latter type the growth was amenable to the *x*-ray treatment, it was a fact worth keeping in mind."

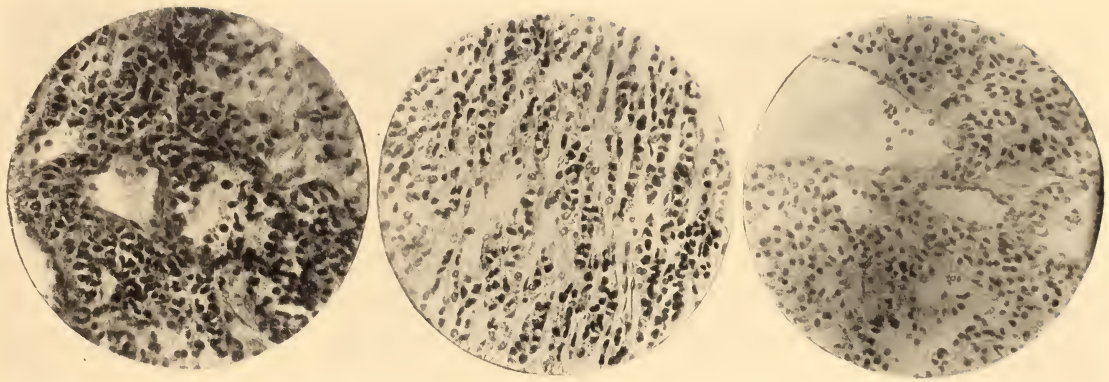
In an article published in the *Riforma Medica*, July 1, 1905, on "Endothelioma of the Stomach Situated Near the Pylorus" (abstracted in the *New York Journal*, August 26, 1905, p. 452), Cignozzi summarizes the clinical features of endothelioma of the pyloric end of the stomach as follows: "The disease as a rule pursues a chronic course (six years in Brissaud's case, and ten years in Oettinger's case). The

symptoms of stenosis develop gradually until the clinical picture of pyloric obstruction (vomiting of food) without previous hematemesis or melena, comes into view. A smooth pyloric tumor which is movable and does not produce any metastasis nor any emaciation, such as occurs in cancer, is also characteristic of these tumors. Accurate diagnosis can only be made on the operating table."

Fig. 1.—Hemangio-endothelio-blastoma growing over gastric ulcer

Fig. 2.—*X*-ray taken after operation, ten minutes after barium meal.

Fig. 3.—X-ray taken after operation, twenty minutes after barium meal.



Figs. 4, 5, and 6.—Sections from hemangio-endothelio-blastoma.

Fig. 7.—Hemangioma of stomach, tumor to left, showing line of attachment of stomach.

Fig. 8.—Stomach everted, showing site of ulcers.

THE SURGICAL TREATMENT OF PERFORATING DUODENAL ULCER

By John Young Brown, M.D.
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While all of our surgical work is done in accordance with certain well-established surgical principles, the outcome of a given case must necessarily depend upon the proper application of these principles to the pathology at hand, in other words, to the judgment of the operator. It would be poor judgment to resect a gangrenous bowel on a patient septic and toxic, when an artificial anus promised a chance for his life. Likewise, it would be unwise to do a radical prostatectomy on a patient with a septic bladder and bad kidneys and low resistance, without first giving him proper preparatory treatment.

Quite recently, Dr. George Crile, a Fellow of this Association, has called our attention to the great value of the two-stage operation as a means of reducing mortality. If we will look over our records for ten years back, there are few of us who will fail to find many cases where death was due to too little or too much surgery. There is no surgeon today who has attained eminence in his profession by reason of the fact that he is a brilliant manipulator of instruments. On the contrary, circus and show-off surgery has too often been practised on those who possessed no pathology indicating operation, and the postoperative results following such unnecessary surgery left the patients in a condition which required both skill and sound surgical judgment to relieve.

I wish to report briefly the following case, which I hope will bring out a discussion of some of the points involved in the handling of acute perforations.

Mrs. John McD., white, female, aged forty-eight years, entered St. John's Hospital on March 9, 1914. Her history is as follows: Trouble began about eight years ago with gaseous eructations having a sour taste, accompanied by a sense of distention and discomfort in the stomach, and sometimes after eating a hearty evening meal she would be forced to get up during the night and vomit, thereby gaining relief. This trouble has not been constant, but has appeared in the form of intermittent attacks about six weeks or two months apart and lasting for about a week. These attacks have been increasing in severity and frequency for the past two years, and she has noticed a severe burning pain in the epigastrium coming on from one to three hours after eating. She states that vomiting sometimes increases the burning sensation; at other times it relieves it. Often wakes up at night with a desire to vomit. Has never vomited blood nor coffee-ground material. Even in her intervals of apparent health she had to be very careful of her diet, fruit and vegetables being especially apt to cause this burning sensation from one to two hours after ingestion. She had lost thirty pounds in weight. The present attack, which she describes as being by far the most severe, began on the night previous to entrance to hospital, without apparent cause, commencing with a violent attack of vomiting, lasting all night and day. On March 10, she suffered an intense burning sensation in the epigastrium. Her condition was such that her physician advised her to enter the hospital.

On admission, examination revealed a poorly-nourished woman complaining of pain in the epigastrium and right hypochondriac region. There was considerable tenderness of the gall-bladder area, but no other objective physical findings. Temperature was 99° F.; pulse, 100; and re-

spiration, 30. Blood analysis: whites, 9600; erythocytes, 3,900,000; hemoglobin, 80. Urinary analysis, a trace of albumin and few granular casts. Stomach analysis, total acidity 70, free HCl. Microscopic analysis, numerous large and small sarcinæ and food remnants. Fecal analysis showed occult blood. Fluoroscopic examination revealed a dilated stomach containing a marked six-hour residue of bismuth; no incisura or other findings of gastric ulcer. A diagnosis was made of benign pyloric obstruction. Early in the morning following her admission, she became decidedly worse, and an immediate operation was undertaken.

Operation. Under ether anesthesia, the abdomen was opened through the right rectus muscle. In the region of the gall-bladder and duodenum there was marked localized peritonitis. Separating the adhesions of the gall-bladder to the duodenum, a perforation the size of a lead-pencil, through which bismuth was freely flowing, was located. The perforation was immediately closed and reinforced with an omental graft. The question came up as to whether or not the patient's condition was such that we might proceed with a posterior gastroenterostomy. We immediately concluded that such an operation was out of the question, and, instead, we did a jejunostomy, in the hope of building her up by liquid feeding. She recovered nicely from this operation, and under liquid feeding she gained twelve pounds in three weeks.

The second operation consisted of opening the abdomen, closing the jejunal fistula, and doing a posterior gastroenterostomy.

From this operation, she recovered nicely, left the hospital in two weeks, and her husband reports to me that she is now in perfect health, having gained at least twenty pounds.

HAIR BALLS, OR HAIR CASTS, OF THE STOMACH AND GASTRO-INTESTINAL TRACT

WITH SPECIAL REFERENCE TO THEIR PREOPERATIVE DIAGNOSIS BY RADIOGRAPHIC METHODS OF INVESTIGATION, AND A REPORT OF A LARGE HAIR CAST OF THE STOMACH SUCCESSFULLY REMOVED BY GASTROTOMY.

By Rudolph Matas, M.D.
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The presence in the human stomach of a hair ball, hair cast, trichobezoar or phytotrichobezoar (when vegetable fibers are mixed with the hair), or egaropiles ("sheep's wool")—as these masses have been variously termed—though infrequent, has ceased to be a very rare condition—over 73 cases having appeared in the literature since M. Baudamant[1] reported the first specimen of this kind in the *Journal de Médecine*, Paris, in 1779.

My colleague, Dr. W. W. Butterworth,[2] in a most interesting and valuable paper, contributed to the pediatric section of the American Medical Association in 1909, was able to compile and analyze a total of 42 cases, including one personal observation, which, after a thorough bibliographic research, he was able to find in the literature up to that year.

Dr. G. A. Moore,[3] of Boston, Mass., in reporting an interesting case of hair cast in the stomach, in the *Boston*

Medical and Surgical Journal for January 1, 1914, after a fairly extensive search, found 53 cases mentioned in the literature.

The latest contribution by Dr. Ledra-Heazlitt,[4] of Auburn, N. Y., which appeared in the *Journal of the American Medical Association* of January 10, 1914, increases the list to 70 reported cases. These reports include hair tumors throughout the gastro-intestinal tract found on necropsy as well as by operation. Desiring to isolate the cases discovered by operation, Dr. Heazlitt, in reviewing the literature, has collected 41 cases. If to these we add a second case reported by C. Thurston Holland,[5] of Liverpool, and a case successfully operated by Treplin,[6] as well as the present instance (all reported in the course of the current year) there would be at least 73 reported cases, of which 44 have been operated upon since Schoenborn[7] first removed a tumor of this kind by operation, in 1883.*

*Since the reading of this paper on December 15, 1914, Dr. W. C. Carroll,[8] of Rochester, Minn. (Journal-Lancet, January 15, 1915), has reported an additional successful case operated by Dr. Charles H. Mayo, in which the existence of a gastric hair ball was revealed in the course of an exploratory operation to clear up an obscure diagnosis of abdominal tumor. A hair ball was considered as one of the possibilities, but no *x*-ray examination was made. The patient was a girl, aged ten years. The operation was performed June 11, 1914. The hair cast weighed two pounds, and measured 12 x 25 x 7 cm. The patient made an uneventful recovery. The operation was mentioned by Dr. Mayo in the discussion of this paper. He also referred to a successful gastrotomy for hair ball which had been reported by Dr. Ekehorn, of Upsala, Sweden, in which the preoperative diagnosis with *x*-rays had been made. I gathered from Dr. Mayo's remarks that the patient had been exhibited to him and other American surgeons who were visiting the Upsala clinics in the summer of 1914. Another case of hair ball, the size of a hen's egg, causing acute ileus in a woman, aged forty-five years, and relieved by enterotomy, was reported by Dr. Le Grand Guerry, of Columbia, S. C., in the discussion of this paper.

Dr. Walton Martin,[9] of New York, presented a woman, aged twenty-four years, at the meeting of the New York Surgical Society, April 22, 1914 (Annals of Surgery, 1914, vol. lx, p. 764), from whose stomach he had successfully removed (a few weeks previously) a large hair cast.

Of these, 38 cases were gastrotomies for hair balls which, in several cases—as in our own—were prolonged into the duodenum; 4 were enterotomies, or intestinal resections in which one or more hair balls were found in the small intestines, chiefly the ileum; while in two others, both gastrotomy and enterotomy were performed on the same patient for separate hair tumors—the operation having been performed at different times in both instances. (Heazlitt.[4])

The habit of hair swallowing appears to be practically confined to females. Of the 44 operated cases, all occurred in either girls or young women, except one, the youngest being six years of age (Treplin's[6] case, 1914), and the oldest, a man, aged fifty-two years (Koogken's[15] case, 1883). In most instances (75 per cent., Butterworth[2]) where a history was obtainable the habit had existed from early childhood and had continued over a period of several years. Once it had existed thirteen years (Schulten's[16] case); in another, fifteen (Best's[17]); seventeen in a third case (Russell[18]), and twenty-two years in a fourth (May[19]). In our own case the habit had probably existed for fourteen years. The greater number have preferred their own hair, either pulling it out and swallowing it, or chewing the ends of the braids or curls; but occasionally swallowing, in addition, such

The preoperative diagnosis of hair cast was made by the radiologist, Dr. LeWald, the fluoroscopic image being similar in every way to that described by Dr. Thurston Holland,[5] whose method and interpretations are frequently quoted in this text. The patient admitted the hair eating habit.

Dr. Martin's case would be the eighth recorded in which the diagnosis of hair ball in the stomach has been made by a preliminary *x*-ray examination: Kampmann, 1911;[10] Hüttenbach, 1912;[11] Ramsbottom and Barclay, 1913;[12] Holland, 1914;[5] K. Schwartz, 1913;[13] Francke-Lehmann, 1914;[14] Ekehorn, 1914; Martin and LeWald, 1914.[9]

If we add the cases reported by Mayo, Ekehorn, Martin, and Guerry to those mentioned in the text, there would be a total of 77 reported cases of gastro-intestinal hair balls or casts, of which 48 have been operated, with 2 deaths, or a little over 4 per cent., including in this 3 enterotomies. It is probable that if a careful canvass were made among the surgeons of the day, many unreported cases would come to light, which would swell the statistics very considerably.

articles as bits of string, cotton, wool, etc., which have formed a nucleus for the hair tumor. In only two instances (Heazlitt[4]) has hair from a foreign source been removed. One patient, a woman spinner of cow's hair, was in the habit of moistening her fingers with the tongue, and thus swallowed enough to form a spherical hair ball in the stomach weighing about four ounces. The other patient, a woman, aged thirty-seven years, a brush-maker by trade, ate the bristles used in making the brushes, and the hair tumor was composed of this material.

In the majority of the cases it is not clear why the perverted habit leading to hair eating existed. One who is familiar with the pica or bulimia or earth and clay eating which is so common a feature in the history of infantile uncinariasis, is surprised that hair balls are not more frequent in the hookworm infested districts of the South and the Tropics; but evidently the appetite for dirt or earth of the hookworm victim does not extend to hair. In fact, as Butterworth[2] remarks, it is not noted that the presence of intestinal parasites has played an important part in its etiology, for he could find only two such instances, his patient, a girl, aged eight years, a native of Mississippi, who succumbed to the effects of a large hair ball, combined with those of chronic uncinariasis, before any operation could be performed for her relief, and one of Quain's[20] of London, presumably a helminthiasis, not of the hookworm variety, however. A third is the subject of the present observation, a native of Alabama, who for years had been the typical victim of the hookworm disease. Contrary to general belief, insanity or mental derangement does not appear to play an important part in the causation of the habit; in fact, only 4 patients in a list of 73 gastric hair balls, appear to have been insane, and in these, with one exception, other substances besides hair, such as nails, tacks, leaves, cocoanut fiber, and twine, were the chief components of the gastric bezoars. It is probable, as Butterworth[2] justly remarks,

that the custom of young girls wearing their hair long, loose, and flowing over the shoulders, is an important factor in favoring the establishment of the practice of biting the hair, or passing strands through the mouth or between the teeth. This is most likely the reason why a hair bolus is practically confined to the female sex, and accounts for its greater frequency at an age corresponding to the period of a girl's life when her hair is worn long and loose. Biting hair and swallowing it is, in this respect, analogous to the habit of biting the finger nails, which is common to both sexes in the early childhood and adolescence; the hair eating preponderating in women solely because of the greater opportunity and temptation offered by the long hair of the girl.

The most frequent situation of these hair balls is in the stomach. It is relatively rare for these to be found in the bowel. In only 6 of the 44 operated cases were hair balls found in the intestinal tract (Heazlitt[4]). The tumor usually consists of a large accumulation of hair of varying length, firmly matted into a hard mass, which often completely fills the cavity of the stomach and is shaped by its walls into an exact cast of the organ. The general contour of the hair ball of the stomach, when fully developed, corresponds to the shape of the letter J, thus reproducing the normal stomach outline as disclosed by the fluoroscope or radiograph. The hair masses may occasionally be multiplied or joined by faceted surfaces. In animals, it is not unusual to find a number of hair tumors at the same time in the stomach. One writer, quoted by Nathan Jacobson,[21] speaks of as many as 9. Holland's[5] second case, illustrated in this article, shows three distinct divisions in the *x*-ray picture. These are so molded to each other that together they formed a perfect cast of the stomach. They are not infrequently prolonged, as in the present case, by processes that extend into the duodenum or, more rarely, into the esophagus. In only 1 case (Gemmel's,[22] 1894) was a hair ball localized exclusively in the esophagus, a part of which projected

into the stomach. This was an insane man, aged forty-three years, in whom a gastrotomy revealed the presence of 192 nails, pieces of screw, a brass wire, carpet tack, several small pieces of stick, and the above mentioned hair ball which was removed from the esophagus. Just why more tufts of hair, which must be ingested in small quantities at a time, do not pass through the bowel, is not always clear. One assumption is, that the individual bits of hair reaching the stomach are caught in the mucous folds and thus retained, and that subsequent additions gradually attach themselves to the primary nucleus in the formation of the mass. The movements of the stomach of the carnivorous animals have been recently more thoroughly studied with the help of *x*-rays. Dr. Cannon[23] administered different quantities of bismuth with food and, after giving it to a cat, made a series of *x*-ray pictures of the stomach while the process of digestion proceeded. It appears that the food is crowded onward from the cardiac to the pyloric end by rapidly recurring peristaltic waves, and that the stomach contents when filling this organ, are compressed by its muscular contraction and perfectly molded to conform with the interior of this organ. And so we must assume that when a foreign substance, like hair, steadily accumulates and ultimately fills the stomach it is similarly acted upon and receives the imprint of the contracted organ. Instead of a "hair ball," we have, therefore, a "hair cast" of the stomach. (Jacobson.[21])

Hair balls and hair casts of the stomach often attain large proportions. According to Butterworth,[2] one of the smallest (Pell-Ilderton's[24]) weighed, dry, two and a quarter ounces, or about one-third of its original weight. Several were over two pounds, as in our case. O'Hara's,[25] Baudamant's,[1] Dandois',[26] and Swain's[27] weighed five pounds three ounces, while Mermet de Hautveille's[28] is reported to have weighed about six pounds, which after nineteen days of desiccation weighed two and half pounds.

The clinical history of these patients is fairly well illustrated by the subject of the present observation. It is remarkable, as Butterworth[2] states, how little the general health suffers, considering the duration of the habit. Eventually the limit of toleration is reached, and nature protests. "Pain is a fairly constant symptom; vomiting, at some time or another, is usual, and yet, considering the sponge-like and absorbent character of the hair cast it need occasion no wonder if vomiting does not occur. This is readily understood when we realize how ineffectual must be the effort of the stomach to empty itself, when it is literally filled with a mass which is not only molded to its walls, but is itself an effective obturator or plug applied to the esophageal opening. Hematemesis is comparatively rare, while dyspepsia and abdominal tumor are usually the earliest symptoms. It is rather surprising that ulceration is not reported more frequently."

According to Wölfler and Leiblin,[29] in their monograph on foreign bodies in the gastro-intestinal tract (1909), only 5 cases of hair ball in the stomach, causing ulceration of this organ, have been reported. Butterworth[2] and Clairmont[30] (Vienna) have each added one case, making in all, as far as I know, 7 cases. Of these, 6, including Butterworth's[2] case, ended in perforation and death. The ulcer, in all of these, occupied the greater curvature; only in the seventh case (Clairmont's[30]) was the lesser curvature the seat of the ulceration. This operator, after removing the hair ball from a girl, aged eight years, found it necessary to resect a large ulcer of the lesser curvature by a gastrectomy which involved one-third of the stomach. The patient made an uninterrupted recovery.

"Alternating attacks of constipation and diarrhea are the usual rule. Eventually the breath becomes exceedingly offensive; anemia grows more pronounced, ingestion of food more difficult, emaciation and exhaustion more noticeable and, unless surgical measures are instituted, with rare exception death occurs from inanition or perforation."

The history of these tumors only illustrates the extreme tolerance of the stomach to foreign bodies and its wonderful adaptability to the most disturbing mechanical obstacles in the normal exercise of its function.

The operative treatment of these hair masses in the stomach has contributed one of the most brilliant chapters to the history of gastric surgery. In 38 gastrotomies reported, not a single fatality has occurred. Only 2 cases in the series of 41 operative cases died, including enterostomy (Heazlitt[4]), and these fatalities occurred when the operations were performed on nearly moribund children suffering from advanced obstruction due to hair accumulations in the ileum. (See comments on mortality in foot-note on page 573.)

The technique of the gastrotomy for the removal of hair ball does not differ essentially from that which is applied for the removal of foreign bodies from the stomach in general, with the exception that the incisions required on the anterior surface of the organ, midway between the lesser and the greater curvature, are often of unusual length, in order to dislodge and extract the enormous mass without traumatizing the stomach wall unnecessarily. More than usual care is also required in the intraperitoneal exclusion of the cavity, as it is often impossible to deliver the enormously enlarged stomach and extraperitonealize it to insure the most perfect asepsis. These masses are usually so foul and putrid, as the result of long-standing fermentation and decomposition of the hair, which is mixed intimately with the residue of food of all kinds, that great care is required to prevent the contamination of the peritoneum and abdominal walls with the drippings from the thick, slimy ooze that covers them. The odor emanating from these masses is so putrid and malodorous that even after weeks of immersion in preservative solutions of formalin and other antiseptics, the nauseating odor still clings to them as is well illustrated in the present case. However, it is evident that, by the ordinary exercise of caution, in the hands of experienced surgeons, the risk of contamination

and peritonitis has been successfully met, as shown by the uniform success and freedom from mortality which has attended the operations thus far recorded.

The indications and success of the surgical treatment of this condition having been clearly and firmly established, the chief interest in the clinical study of these cases lies in the preoperative diagnosis.

The Preoperative Diagnosis. It is to this feature of the subject that I wish to direct special attention. From this point of view the mere presentation and exhibition of these cases in medical societies is profitable, as the description of an actual occurrence and the exhibition of such a striking specimen as the one here shown will be of benefit in reminding a puzzled diagnostician of one of the possibilities he might have overlooked in the analysis of a doubtful and problematic case. The difficulty of the diagnosis in gastro-enteric trichobezoars is well attested by the fact that of the 44 cases in which an operation was performed in only 10 was a correct diagnosis made before operation. In the majority of cases, simple exploratory laparotomies were performed for tumors of admittedly unknown origin. In others, various conditions were suspected, such as floating kidney, movable spleen, omental tumors or hydatid cysts, tuberculous peritonitis, or malignant growths of the stomach. In one case the hair tumor was supposed to be a twin pregnancy. Until the advent of systematic *x*-ray examinations the nearest approach to a preoperative diagnosis has been a gastric tumor. The history and antecedents are often useless, as the patients for the most part, fail to describe their habits or deny them altogether. Even when the suggestion of hair swallowing is offered, it is indignantly repudiated. It is only when confronted with the corpus delicti itself, after the operation that the patient will admit the habit. The first to record a direct diagnosis prior to operation, according to Wölfler and Leiblin,[29] was Stelzner,[31] in 1886, who diagnosed a hair

ball in the stomach, in spite of the patient's denial, because the tumor could be moved to and fro like a billiard ball in the dilated stomach. But, even with this evidence before him, Stelzner[31] would probably not have been certain of his diagnosis had he not had Schoenborn's[7] case in mind, which had been previously reported in Langenbeck's Archiv, 1883. Paton,[32] in 1902, made the second correct diagnosis on the information that the girl was known to be a hair swallower and had already vomited a hair ball; also in Ranzi's[33] in 1904, the preoperative diagnosis of hair ball was stated as very probable, and likewise in Harvie's[34] case in 1908, because the child had been in the habit of swallowing hair and woolen thread. A correct diagnosis was also suggested to Scott Turner[35] after a hair tumor had been removed some weeks previously from the bowel of the same patient. As far back as 1886, Knowsley Thornton[36] came very near the truth in assuming that the transverse colon was the seat of a hair ball in his patient, because it had been noticed that hairs were passed in the stools, and gastric symptoms were absent. At the time of the operation, however, the hair ball was discovered in the stomach. Before the hairs were discovered in the stools, the tumor was regarded as a fecal mass. In the vast majority of the earlier cases, the tumor was only recognized at necropsy or at operations performed under a mistaken diagnosis.

In many cases the physical signs alone, in view of the slight gastric disturbance, must furnish the basis for the diagnosis. It should be remembered that hair balls are limited and usually well defined, hard, painless tumors, situated in the upper abdomen, where they assume different forms according to their stage of development, and are, therefore, variously described as gourd-like, cucumber-shaped, sausage-shaped, J-shaped, oblong or spherical masses. They are scarcely, if at all, tender on palpation. The tumor is also characterized by considerable mobility, often in all directions but especially toward the left costal arch.

In the cases in which the tumor does not fill the stomach the relation of the mass to the gastric wall, after insufflation with air, is important. In this way the tumor can be shown to lie *in* the stomach. On palpation the tumor can be felt and separated by a layer of air from the abdominal wall. Gastric lavage, in cases which do not fill the stomach completely, may bring out strands or pieces of hair in the washings; but all these signs are very uncertain and, unless the suggestion is offered by a previous history of hair swallowing (trichophagia), the diagnostician is likely to overlook the real nature of the gastric mass.

The Radiologic Diagnosis. It is only very recently, and since the Roentgen rays and fluoroscope have been so advantageously utilized in the study of gastro-enteric diseases, that a great step forward has been made in the diagnosis of hair balls, as well as of other foreign bodies in the stomach. A number of recent writers have directed attention to the value of x-rays and fluoroscopic examinations in cases of hair balls. Notable among these contributions are the case reports of Kampmann,[10] Hüttenbach,[11] Clairmont and Handek,[30] Schwartz,[13] Francke,[14] Ramsbottom,[12] T. Hausmann,[37] and, especially, of C. Thurston Holland.[5]

Kampmann[10] (1911) reports the case of a girl, aged ten years, in whose gastric region a smooth, rounded tumor, the width of a hand, not tender on pressure, could be palpated. The mass could be displaced upward and laterally, and could be outlined by percussion upon the nipple line from the upper to the lower gastric region. The history, with the presence of hair in the stools, pointed to the diagnosis of trichobezoar; but Kampmann emphasizes the advantages of the x-ray examination, after the preliminary administration of a bismuth meal, which, in this case, rendered the tumor distinctly visible as an *intra*gastric mass.

Hüttenbach[11] (1912) reports a case in which a large mass was observed below the xiphoid cartilage, which was

visibly displaced up and down on respiration, at the site of the tumor, causing a distinct protuberance on the abdominal wall. The mass could be readily palpated, extending from the left to the right hypochondrium. The tumor had the shape of a greatly enlarged stomach, although the lower boundary did not present a uniformly convex surface. Radiography on an empty stomach furnished little diagnostic information, as no sharp shadow contrasts appeared in the abdomen; but a radiograph taken after a "contrast meal" showed dark shadow lines which outlined the contour of a lighter mass in the center of an enormously dilated stomach. The "magenblase" or upper air space of the stomach was entirely absent. The author concludes that the radiographic or fluoroscopic examination of the stomach *after* the administration of a bismuth or other contrast meal is the decisive element in the diagnosis of trichobezoar.

The radiographic diagnosis of hair balls is made the subject of a special discussion by Clairmont and Handek[30] (1911) in a paper in which they reported such a case. A smooth, thick resisting mass, having the configuration of the stomach and slightly sensitive to pressure, could be palpated in the patient's left hypochondrium. The tumor was freely movable, had a rounded contour under the left costal arch, which tapered outward toward the pylorus. In the fluoroscopic examination, with the patient in the upright position, the tumor in the gastric region, which was movable, could be displaced upward until it obliterated the upper air space of the stomach (magenblase), where it formed a dense shadow which somewhat resembled a kidney. The "contrast meal" did not penetrate into the stomach in the usual way, but entered very gradually spreading along the lesser curvature; it then diffused itself in a much larger streak along the fundus and greater curvature, in this way outlining a large central mass, which was evidently detached and separated from the gastric wall. The diagnosis of the gas-

tric tumor was arrived at by the evident presence of a mass which nearly filled the stomach space, and the diagnosis was further advanced to an *intra*gastric foreign body on account of the unusual mobility of the tumor, which could be pushed out by palpation from the greater curvature to the cardiac extremity, where its upper end was made visible against the clear air space.

K. Schwartz[13] (1913) reports the removal of a hair ball from a girl, aged seventeen years. The mass weighed 941 grams. In this case the examination of the stools for hair proved positive. The *x*-ray examination was difficult, because the patient was nauseated after the first barium dose and refused further doses. Nevertheless, the few doses swallowed were sufficient to obtain with great distinctness the following picture: The greater curvature of the stomach, which corresponded entirely with the visible and palpable lower boundary of the tumor, was sharply outlined by the dark shadow contours caused by the opaque meal. The preoperative diagnosis of hair ball was fully confirmed by the operation.

Another patient was operated upon by Francke[14] (1912), and was presented by Lehmann to the Roentgen Congress of 1914. In this case a hard, round, painless tumor was detected in the gastric region. The radiograph showed an uneven spotted lighter area, which filled nearly the entire stomach, and was especially well outlined above a distinctly visible arch. On the basis of the clinical history, combined with the radiographic findings, a probable diagnosis of hair ball in the stomach was made, which was fully confirmed by the operation.

T. Hausmann[37] (1914) describes a hair ball of the stomach in a girl, aged fifteen years. At the time of the *x*-ray examination a peculiar behavior of the gastric shadow was noted. It appeared diffusely blurred, a dense, dark streak being seen only along the sharply outlined greater curvature of the stomach. This blurred portion corresponded

to the hair ball, in the meshes of which bismuth had become imbedded; the dark portion was the free marginal portion of the stomach in which bismuth alone was deposited. This behavior of the gastric shadow was noted only with the patient in the recumbent position. It was furthermore noteworthy that the *x*-ray findings were suggestive of gastrectasis, while the clinical signs of stagnation were absent. These signs are regarded by the author as important indications for the diagnosis of hair ball. Although the diagnosis of hair ball was not made by the writer (Hausmann[37]) nor by others who had seen the patient (the preoperative diagnosis was tumor of the spleen), the author lays stress upon three new signs, to which he attaches special importance in the diagnosis of gastric trichobezoar:

1. The characteristic behavior of the greater curvature on palpation, *i. e.*, the greater curvature of the stomach becomes palpable when the stomach is contracted in active peristalsis and the benzoar is gripped firmly by the muscular contraction. It is not palpable when the stomach is relaxed and does not grip the foreign body.

2. The presence of fatty acid plates and needles in the contents of the fasting stomach, and the absence of starch and muscle fibers. (These peculiar findings were not explained until the operation, when the hair ball was found to be infiltrated with fat which had resisted the digestive juices of the stomach and had been caught mechanically in the meshes, while the starchy and albuminous substances were digested and discharged out of the stomach.)

3. The revelations of the fluoroscopic screen or radiograph when a bismuth meal was administered, which distinctly proved the *intra*gastric position of the tumor.

The spontaneous (peristaltic) displacement of the tumor, which was pointed out by Schreiber[38] (1896) as of diagnostic value, may occur also in other movable tumors, according to the variable contractility of the stomach or intestines. It is of no special diagnostic significance in hair ball, and is, in fact, often absent.

But the special features and proper interpretation of the fluoroscopic image and radiographic picture of hair ball have been presented with far greater clearness in the later observations of Ramsbottom and Barclay[12] and C. Thurstan Holland.[5] Ramsbottom and Barclay[12] (October, 1913) believe that theirs is the first case that has been absolutely and definitely diagnosed by this means. In this case, a woman, aged twenty-eight years, the *x*-ray examination showed the existence of a hair ball. The operation which followed proved the accuracy of the preoperative diagnosis, which was so complete that not only was the nature and shape of the tumor predicted, but also its size, which was given as 9 inches long by 3 inches in width. The examination was conducted with the patient in the erect position, the bismuth meal flowed at once into the stomach and began to canalize down the greater curvature. Presently, as more food was given, the shadow extended along the lesser curvature, apparently around the mass which was evidently, therefore, not to the inner side of the stomach, but either *inside*, in *front*, or *behind* it. A little manipulation and rotation of the patient quickly demonstrated that the mass displacing the bismuth (showing as a lighter area in the midst of the dark shadow of the bismuth) was actually *within* the stomach. By means of palpation, it was easy to demonstrate that it was freely movable within the stomach. The tumor could be displaced, the top of it rising above the level of the bismuth food, and showing as a rounded shadow in the clear air space in the fundus of the stomach. In order to demonstrate the nature of the tumor still more clearly, the fundus of the stomach was distended with CO_2 and into the larger gastric vesicle thus obtained, the hair ball was pushed up. It gave a heavy shadow because of the coating of bismuth it carried up with it.

C. Thurstan Holland[5] reported in 1913 and 1914, two cases of hair ball in the stomach, which, from the radiographic point of view, are of great interest and value. In the first

case, in spite of the suggestiveness of the picture, the exact diagnosis of the true nature of the gastric tumor was only mentioned, but not definitely stated. In the second case, the exact diagnosis was made and stated definitely before the operation. This second case (1914) may be summarized as follows from Mr. Holland's report: A girl, aged sixteen years, was referred to Mr. Holland for radiographic study. The history was that she had a very large abdominal tumor for eleven years. This had been diagnosed at various times by several medical men as a tumor of the spleen, liver, or kidneys. Operation had been suggested, but as no definite diagnosis had been made, the mother refused to allow one. For five or six years, "up to a year ago," there had been a constant vomiting of food. This had stopped twelve months ago, but lately had started again. There was no pain, but some tenderness in the upper right abdomen.

Holland[5] writes: "With a vivid recollection of my first case, the diagnosis appeared quite certain and I made a definite diagnosis of hair ball in the stomach before the *x*-ray examination. The tumor presented itself as a large, hard mass, curving down from below the left costal margin. The right border was quite smooth and curved down with an even edge to two inches below the umbilicus, then turned upwards to the right, to disappear under the lower edge of the liver. It was very hard, and there was tenderness just beneath the liver, to the right of the median line. The whole lower part could be grasped between the hands and then the tumor could be swung from side to side of the abdomen, as if suspended from a fixed point behind the upper left costal margin. The history was then discussed more fully with the mother, and the fact elicited that no one had ever suggested to her any other diagnosis except that of 'tumor of the spleen, liver, or kidneys'—these were the mother's own words. I then asked a direct question: 'Are you sure that no one has ever suggested to you that the tumor consisted of hair?' The

answer was significant: 'No, but now that you mention hair, I remember that when she was four or five years of age she used not only to bite off her own hair, but also, in her sleep, to pick off and chew bits of blanket, etc.' "

The radiographic appearances in this case, as given by Mr. Holland, are so characteristic that they are worth quoting for the guidance of other observers:

"1. Before any food was given, it was possible to make out the general shape of the tumor on the screen and to differentiate it from the liver, as it was thrown into relief by the gas-distended transverse colon. (The plate which shows the radiographic image in our present case (see Fig. 3) coincides perfectly with the observation of Mr. Holland. The distended transverse colon completely outlines the contour of the stomach which appears as a dark shadow covered by the dense hair mass.)

"2. The first few mouthfuls of liquid barium meal remained held up in the cardiac end of the stomach and spread out as if forming a cap to something inside of the stomach. (Holland's plate, Fig. 2.)

"3. Shortly after swallowing a breakfastcupful of the food, the whole stomach was mapped out by what was obviously the barium lying between the walls of the stomach and the less opaque mass filling it. (Holland's plate, Fig. 2.)

"It was then obvious that an enormous mass—the hair ball—filled the entire stomach right up to the pyloric end, the J-shape being most beautifully shown.

"A few days later, Mr. Newbolt removed a large hair ball, 10 inches in length, which weighed two pounds 12 ounces. The patient made an excellent recovery."

From these general observations we may conclude that the preoperative diagnosis of hair ball is possible and not difficult if the following facts are borne in mind:

1. That over 90 per cent. of hair balls occur in girls or young women.

2. That a careful interrogatory as to previous habits in childhood or puberty will often give a suggestive clue to the hair-eating habit.

3. That the examination of the stools frequently reveals particles or strands of hair, and that lavage of the stomach will bring up particles or detached strands of hair.

If these preliminary facts can be obtained, the preoperative diagnosis only needs confirmation by the physical and radiographic examination which should show (*a*) a shadow in the region of the stomach (epigastrium) of a characteristic J-shape (Holland[5]) fringed at its lower border by a crescent lining formed by the gas distended transverse colon. This will (*b*) localize the gastric area and exclude the spleen and omentum, as these lie outside of the colonic loop. The liver can usually be distinguished from the stomach area by a faint darker outline.

4. The further differentiation is accomplished by administration of a contrast meal of bismuth or barium in suspension, which will, at once, isolate the hair ball, either by surrounding it completely, leaving a paler and fainter area wherever the mixture has failed to penetrate the hair mass, or in large hair balls, by the differentiating fluid finding its way between the stomach wall and the tumor. A distinct gastric contour is thus obtained within which the intragastric mass is defined by the gradual spreading of the contrast material on the outer surface of the hair ball. Or if this consists of two or more segments, as in Holland's[5] case, by the penetration of the contrast fluid into the interspace which subdivides the mass. (See Holland's plate, Fig. 2.)

5. Finally, while the progress of the bismuth or barium meal is being watched, the displacement of the intragastric mass can be observed as it is moved upwards or sideways by manipulation. If the displacement of a foreign body within the stomach can be made out clearly and unmistakably, and the mass is more or less molded on the contour of the stomach, it is almost impossible for the mass in the stomach to be anything else than a hair ball.

The real difficulty in the diagnosis of these cases lies in the usual inadvertence or unpreparedness of the operator for the possible presence of a hair ball—the condition being so rare that it is scarcely considered or thought of unless the operator has had his attention directed to it by previous experience or personal knowledge of other cases. From this point of view alone the presentation and discussion of these cases is valuable and should be encouraged in medical societies. In the past, when radiographic investigations were not available, it was never possible to make a preoperative diagnosis except by the suggestiveness of the previous history or the presence of hair in the vomit or in the stools. At present, with a constantly improving fluoroscopic and radiographic technique, everywhere available, it would seem almost impossible to miss the diagnosis whenever the resources of the *x*-ray examination are systematically applied.

* * * * * * * * * *

The Author's Observation. The subject of this observation, Miss B., aged nineteen years, of Geneva, Alabama, was admitted, by recommendation of her family physician, Dr. Chapman, to the Touro Infirmary, on May 5, 1914. She is a pale, emaciated girl, who, though nineteen years of age, has never menstruated. She is intelligent and in every way a sensible young woman, but has been sickly since her earliest childhood. Her parents are dead; both died of cancer; apart from this fact there are no antecedents of special importance, except that she was infested in her childhood, like a great many people in her section of the country, with hookworm. An older sister who accompanies her can add very little to her early history, and recalled no special habits of the patient until the operation revealed the true nature of her present troubled. Five years ago the patient began to vomit. She vomited nearly everything she ate. Never complained of severe pain, only of vomiting, weakness, and a progressive loss of flesh, which reduced her to her present marasmic condition. She also suffered

frequently from headaches, which were attributed to her amenorrhea and marked anemia. Four years ago she consulted two prominent physicians in Montgomery, Alabama, who recognized her disease as uncinariasis and treated her vigorously for this condition. After their treatment she improved very decidedly, and continued to do well for about six months, when she again relapsed and began to vomit her food as before. Her physician states that at that time she had a large mass in the upper abdomen, which he and others thought was an enlarged spleen. Since January, 1914, she has vomited her food more frequently than ever before, and the vomited matter has often been of a dark, blackish color, suggestive of hemorrhagic vomit.

The physical examination on admission, May 18, 1914, is recorded in the history sheet as follows: A pale, thin, undeveloped girl, about five feet in height, and weighing scarcely 100 pounds. The lips and conjunctivæ show some color, otherwise, she is quite pale. The pulse 70 to 80. Blood-pressure: systolic, 118. The blood picture shows the following: Hemoglobin, 60 per cent.; color-index, 0.6. Total red count, 3,110,000; total white count, 12,850; lymphocytes, 31 per cent.; large mononuclears, 2 per cent; polymorphonuclear neutrophiles, 67 per cent.; no plasmodia malariæ.

The feces showed occult blood with the benzidin and guiaic tests, and hookworm ova in appreciable numbers.

The urine was normal. The Wassermann (original) and Tschernogubow were both negative.

The thorax was large and symmetrical, somewhat expanded, and prominent on a level, with lower costal arch. The heart and lungs were normal.

On inspection, attention is at once drawn to the abdomen, which shows a projection or eminence, extending diagonally across the upper and middle abdomen from the left hypochondrium to the upper boundary of the right iliac fossa. This mass moves on changing position to the right or left, as the patient turns to either side. It also

moves during respiration, being displaced downwards on deep and forced inspiration. Standing has little effect upon its position. On palpation, a large crescentic tumor can be felt lying in the upper abdomen, which has the outline of a dilated stomach. The mass distinctly projects from the left hypochondrium and is hidden in its upper and widest portion, under the left costal border, apparently resting under the left dome of the diaphragm, which can be mapped out by percussion dullness. The resonant space of Traube is here supplanted by a dull, flat area. The dull area extends to the fifth costal cartilage in front, eighth rib in the axillary line, and tenth rib posteriorly in scapular line. From this origin, it can be felt as a well-defined, hard, resisting body, extending into the abdominal cavity to a point, two fingers in breadth, below the umbilical level and about four inches to the right of the umbilicus. From the level of the umbilicus, the mass curves up along the linea semilunaris, which it almost touches. The shape of the mass suggests the idea of an inverted gourd with a long neck, the large end or base lying under the diaphragm.

The veins on the surface of the abdomen stand out prominently, especially in the left hypochondrium. The left epigastric anastomosis is particularly well mapped out under the thin abdominal skin. To the touch, the mass feels hard and fibrous; in some places it gives the impression of a ligneous hardness.

From the simple standpoint of topography, the following possibilities were considered:

1. A large tumor involving the stomach itself.
2. A large tumor of the great omentum.
3. A splenomegaly, with displacement of the spleen.
4. A tumor of the left lobe of the liver.
5. A tumor of the pancreas.

At this stage, a radiograph was made by the radiologist of the infirmary, Dr. Samuel. (See Plate Fig. 4.) This plainly showed a tumor shadow which corresponded with

Fig. 1.—Hair ball in the stomach, first case. (By Dr. Thurstan Holland.)

A

B

Fig. 2.—Hair ball in the stomach, second case. (By Dr. Thurstan Holland.)

Fig. 3.—Photograph of hair ball removed from the stomach of Miss M. B. (Dr. Matas' case) by gastrotomy, on May 22, 1914 (T. I., No. 42916). Weight of dry specimen, 2 pounds $\frac{3}{4}$ ounces (about 967 grams); greatest length along greater curvature, 18 inches (46 cm.); along lesser cervature, 9 inches (23 cm.); greatest circumference at fundus, $10\frac{1}{4}$ inches (26 cm.); around middle portion, $8\frac{1}{4}$ inches (21 cm.); at terminal part on duodenal end, $6\frac{6}{8}$ inches (17 cm.). All measurements were taken from the dry specimen.

Fig. 4.—Retouched radiograph of Miss M. B. (Dr. Matas' case.) Hair ball in the stomach, showing Holland's characteristic "J" shaped shadow occupying the entire gastric area enclosed within the gas distended loop of the transverse colon. No contrast meal. Exposure two seconds with screen. (From the *x*-ray laboratory of the Touro Infirmary, New Orleans.)

the position of the dilated and prolapsed stomach, which in outline was identical with the big "J" of the normal stomach. This outline was well defined by the loop of the gas distended transverse colon, which fringes the greater curvature of the stomach from the hepatic to the unusually high splenic flexure.

The radiograph plainly excluded the spleen, liver, and omentum, and definitely localized the tumor in the gastric area. The mobility of the mass excluded the pancreas. Here the diagnosis rested, as a large tumor of the stomach of unknown character. Unfortunately, no bismuth meal was given, and this was a great omission, as the percolation of the opaque fluid between the gastric wall and the tumor itself would have clinched not only the diagnosis of a gastric tumor, but an *intra*gastric and detachable mass, which could be moved (by manipulation under the fluoroscopic screen) within the gastric shadow, as outlined by the contrast meal. If this had been done, we would perhaps have thought of a hair ball as the only foreign body which could mold itself to the shape of the stomach and attain such large proportions. We would then probably have gone back to the patient and cross-questioned her for evidence of hair swallowing, an admission which was obtained easily enough when the patient and her sister were confronted after the operation with the corpus delicti. As it was, the attending physician, who lives far away, was anxious to be present at the operation and as he was pressed by the necessity of his early return home, we decided not to delay the operation on account of further fluoroscopic examinations. The indication for relief was urgent, and justified an exploration of the tumor, which was clearly connected with the stomach, but was still of an unknown nature or causation. If we had only followed our routine custom, to make systematic *x*-ray examination with the aid of contrast meal in all cases of gastric disease, we would probably have had the satisfaction of completing the diagnosis *ante* and not

post operationem, and thus have anticipated the revelations of the operation on May 22, 1914. The operation was performed under ether anesthesia (Dr. Landry; assistants, Drs. Gessner, Craddock, and Turner).

Median incision about six and a half inches in the epigastric region, extending about one and a half inches to left of umbilicus. The stomach at once presented, very much dilated, with transverse colon attached to its lower border. It became evident immediately that the tumor was intragastric and not attached to its walls. An incision, six inches in length, was made along the anterior surface, in the space midway between the lesser and the greater curvature, with its center about the middle of the anterior surface of the stomach. The stomach walls, on examination, were found to be hypertrophied. The bleeding from the walls of the stomach was controlled by prophylactic clamping. A huge hair ball, slimy, and coated with foul gastric secretion, and of exceedingly hard consistency, was now revealed. The mass was shaped like the stomach, following the contour of the fundus, the greater and lesser curvature and pylorus. It was extracted entire, without great difficulty and, when removed, had the appearance of a large gourd. After wiping off the cavity of the stomach, which contained chyme and considerable thick, tenacious mucus, the gastrotomy incision was closed by four planes of sutures. The first two rows of sutures were hemostatic and included only the mucosa. The seromuscular coat was sutured separately and a final inverting stitch, continuing at right angles, was made with linen, which had been used for all the other sutures.

After finishing the toilet of the peritoneum, the abdominal wound was closed by sutures; the peritoneum with iodized catgut (Bartlett); the muscular planes with the same material, and the skin with through and through silk-worm sutures and plain iodized catgut.

The specimen weighed two pounds three-fourth ounces, or approximately 967 grams. It was shaped like an inverted

gourd and was molded to the contour of the stomach. In the dry state, it measured 18 inches or 46 cms. in its longest diameter (along its convexity), $10\frac{1}{4}$ inches or 26 cms. in its broadest circumference; $8\frac{1}{4}$ inches or 20 cms. around its middle portion, and $6\frac{1}{8}$ inches or 17 cms. in its narrowest circumference. The widest part filled the fundus of the stomach, and its narrowest filled the pylorus and duodenum.

It consisted of a mass of matted black hair which, when dry, was felted and gave the appearance of the fur of a wild animal. Mixed with the hair, were particles of earth and vegetable foodstuffs which had gravitated to the center of the mass and were held in the tangle by mucoid and other organic matter. The mass not only filled the stomach in its entirety, but was gripped tightly by its walls in many places.

An incision of $6\frac{1}{2}$ inches along the anterior surface of the organ was required to permit its extraction. When extracted from the stomach, it was covered with a thick, slimy coat of extreme foulness. The only space for the passage of food was a narrow interspace between the mass and the lesser curvature, where fluids and semisolid foods could be forced from the cardia to the pylorus.

When the patient's sister was told of the nature of the mass, she recalled that the patient had, in earlier childhood, when about six years of age, begun to chew her hair. At first no one suspected this habit, but the fact that her hair never grew long and was apparently always kept cropped, led to an investigation, when it was discovered that she chewed and swallowed her own hair. How long she continued in this practice is not known with exactness, but the girl admits that up to comparatively recent years she indulged in the habit unconsciously and as a mere habit which had grown upon her, without any explanation in her own mind except that she found a childish pleasure in chewing her hair, as well as crumbs of earth and clay, as is often the case with the victims of hookworm disease.

The subsequent history of the patient is uneventful. Apart from a stitch abscess, the wound healed well, and her general condition improved with extraordinary rapidity as convalescence was established and a normal gastric digestion returned. She was discharged from the infirmary on June 19, quite strong and gaining rapidly in flesh. Since her return home she has gained steadily in weight and is now enjoying better health than at any previous time in her life.

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SUPPLEMENTARY COMMENTARIES ON BEZOARS.

A great deal of curious information pertaining more to the domain of medical archeology and history, rather than to practical surgery, is associated with the history of bezoars. While not pertinent to a strictly practical paper on the subject of hair balls (which are only a variety of bezoars) the author believes that a supplementary note, written largely from the antiquarian's point of view, may prove of interest to the general reader. Many references of bibliographic and archeologic interest in connection with bezoars may be found in the Catalogue of the Surgeon-General's Library and the *Index Medicus*. An excellent historical summary will be found in the *Dictionnaire Dechambre*, by Dechambre. The latest contribution to this curious subject is presented by Dr. A. Burchard, under the title "Bezoars in die Alten und in der modernen Medizin,"* which not only discusses the history of bezoars, but also considers them most interestingly from the point of view of their *x*-ray relations. I have quoted freely from this valuable and most recent paper, eliminating the *x*-ray discussion as applied to human hair balls, as this phase of the subject is fully discussed in the text of this paper.

Bezoars represented an important remedy in the phar-

* Fortschritte auf dem Gebiete der Roentgenstrahlen, vol. xxii, h. 3, p. 321.

macopeia of Antiquity and of the Middle Ages, even up to the eighteenth century.

Among ancient Hindoos, bezoar stones from goats' stomachs were a well-known remedy, which is mentioned in the writings of Susruta in the twelfth century before Christ. It is met with again among the Persians in the manuscript of Muwaffak (968–77) (Liber fundamentorum pharmacologiæ) where the bezoar of goats is also enumerated among 44 drugs derived from the animal kingdom. The Arabs were likewise acquainted with this remedy and the word "bezoar" is probably derived from the Arabian word Badzehr, so that it is of Arabian origin.

Very curious myths were told of the origin of bezoars. In a book of Adam Lowicer, 1582, they are described as solidified or hardened tears of stags. The stags eat poisonous snakes to protect themselves against intestinal worms and then stand for several days up to their neck in water, so that the snake venom may not harm them. Rosin-like tears flow from their eyes, which harden and are rubbed off by the animals on the trees. For accuracy of this statement, Lowicer refers to the Arabian physician, Albenzoar.

The same story is told by George Nikolaus Schurtz, 1673, in his "Material Kammer" where another mode of explanation is added: "In Peru, the Vicuna sheep eat bezoar herbs in order to protect themselves against poisonous pastures and water. This excellent herb causes the bezoar stone to grow in their stomach and it therefore has the power to destroy poison."

A "catalogue omnium medicamentorum" published in Braunschweig, Germany, in 1706, still contains "Lacrymæ cervi" which certainly means bezoar, and a price list of H. D. Brückner, in Leipsic, also in the eighteenth century, begins with "aegagropylæ," goat balls, or bezoars, which had been forgotten in the interval.

Much confidence was placed in the effect of bezoar stones, which were considered the best remedy against poison, and

as extremely efficient against pestilence. Medical agents, which were credited with similar effects, were therefore frequently named after bezoars, so that there was a tinctura bezoardicus, a pulvis bezoardicus, etc., preparations which really contained no bezoar at all.

"Greswell, in his work on *Diseases of the Ox*, states that at one time they were supposed to possess the power of enchantment against the viper and the scorpion, against vertigo, epilepsy, dysentery, inflammation of the lungs, malignant fever, the plague, leprosy, and many other maladies. According to this writer, it was put down to the astonishing power of the bezoar that King Edward IV was strengthened and preserved from the effects of an empoisoned wound, and the same magical influence was supposed to be the reason why the Emperor Charles V was enabled to free himself from the dreadful thoughts which haunted and disturbed his mind." (N. Jacobson.)

No wonder, then, that the superstitious and credulous mediæval mind treated these animal concretions with all the reverence and awe of precious amulets and that some of these bezoars were encased in golden caskets encrusted with precious stones.

"Oswald Croll (1609) mentions bezoar as a constituent of pills which were named Laudanum Paracelsi. In view of this high esteem of bezoar, it is not surprising that it commanded a high price. Oriental bezoar was considered more precious than gold. As a natural sequence, adulterations and imitations made their appearance; balls made of all sorts of substances were passed as bezoars. Lowicer (1582) warns against these and mentions three tests to protect against frauds: (1) Pierce the stone with a red hot needle. If it is genuine, there will be no smoke. (2) Administer poison to an animal or man, and give a powder made from the stone as a remedy. If the individual survives, the stone is genuine. (3) Trituate the stone with saliva, or with water. If it is genuine it will discolor a cloth."

In more enlightened days, bezoars as well as bezoardic remedies were abandoned as curative agents and are now met with only as historical curiosities in collections. An entire series of these rare stones are preserved in the collection of Pharmacological Institute of the University of Rostock. Following a suggestion of Kobert, Burchard submitted these stones to *x*-ray examination, in order to seek information concerning their structure and composition. These investigations yielded some remarkable findings. Ancient medicine was concerned especially with two kinds of bezoar stones, the Oriental and the Occidental. The Oriental bezoar which occurs principally in the fourth stomach and the intestines of the bezoar goat (capra aegagrus) living in Syria and Persia, and of the gazelle (antilope Dorcas) consists chiefly of cholesterin, bile pigments and bile salts. It is entirely combustible, diffusing an aromatic odor. The Oriental bezoars examined by Burchard, were, in part, rounded, and in part oval in shape; the exterior was mostly smooth almost glistening; the diameter between 1 and 5 cm. The radiograph did not invariably show an entirely uniform mass. Most of these bezoars present an internal nucleus the size of which varies according to the size of the stone. One bezoar was so compact that the mass did not permit the *x*-rays to penetrate, although it was smaller than others, the structure of which was plainly recognizable. Not the slightest suggestion of a structure could be obtained in two spherical preparations of the size of a walnut and of hen's egg, respectively, which were gilded on the outside and were described in the catalogue as Bezoar de Goa, an especially esteemed variety. Perhaps these are not concrements at all, but artificial products, so that the *x*-ray may permit the distinction of true concrements from artefacts, under certain conditions.

Occidental bezoars come from South America, namely from the Vicuna sheep (Auchenia Vicuna) and differ from the Oriental by their contents in calcium and magnesium phos-

phate, from cholesterin, bile pigments, and bile salts, so that an incombustible residue is left on incineration. Several specimens were examined by Burchard. Three rough grayish white concretions are designated in the catalogue as Bezoar Porci, presumably from the stomach of the pig.* The radiographs show a variable appearance.

The term "bezoar" aside from the above described concretions which were formerly employed for curative purposes, is also applied to another kind of concrement. The hair bezoar or trichobezoar, is frequently found in the gastro-intestinal canal of the domestic animals, notably the horse, cow, angora cat, etc., and, in rare cases, in the human stomach. Radiographs of trichobezoar (hair balls) show the closely packed masses of hair. The diagnosis of the presence of similar concretions in the stomach or intestines, in the subject, has always proved very difficult and has rarely living been rendered. In the recent past, the *x*-rays have come to the front as an important diagnostic adjunct as we have seen in the text of this paper. As regards the utilization of the *x*-ray method for the discovery of concretions in the gastro-intestinal canal of animals, where they frequently exist, not much has apparently been accomplished so far, and Marck says in his textbook on the clinical diagnosis of the internal diseases of the domestic animals in 1912, that a successful *x*-ray examination of the abdominal organs is probably possible only in small animals, because the abundant gastro-intestinal contents of large animals practically prevent the penetration of the *x*-rays. Also, in small animals, *x*-ray examinations have so far been limited to the demonstration of foreign bodies in the abdomen and intestines.

Dr. N. S. Mayo, of Chicago, President of the American Veterinary Association, a distinguished authority on this subject, confirms the general impression gathered from

*Valentini (W. B.). De lapide porcino, vulgo pedra del porco [in his: Polychresta exotica, etc.], 4°, Francof. ad Moenum, 1700, 30–44.

veterinary texts that "though hair balls are quite common in cattle, they seldom cause inconvenience and are rarely recognized except on autopsy, or when the animals are slaughtered. In most cases, in cattle, these hair balls are found in the rumen, or first division of the stomach, although they may be found in the third and fourth divisions. In a majority of cases, the hair balls become crusted with salts, so that they are hard and frequently present a polished surface. Some, however, are furry on the outside. The majority of these hair balls vary from the size of an egg to a man's fist." Dr. Mayo adds: "So far as I can recall, I do not remember that a hair ball has been definitely diagnosed in cattle before the death of the animal. Cattle frequently swallow hard objects such as bone, pieces of metal, old shoes, rags, etc., that give rise to digestive disturbances, but it would be difficult to differentiate between a hard body of this character and a hair ball."

Dr. Hugh A. Trout, of Roanoke, Virginia, suggested in a personal conversation with the writer that hair balls might possibly be dissolved *intra vitam* if they could be recognized early enough by *x*-rays, by the use of a hair solvent, such as is used in depilatory pastes in which barium sulphide and starch are the chief ingredients. Dr. Mayo, above quoted whom he consulted on this point, stated that he was very skeptical as to the efficiency of such a solvent. "In order to obtain a fairly efficient action of barium sulphide, it is necessary that it come in rather close contact with the hair and be held there for a few minutes. The condition of hair balls, as commonly observed in cattle, is such that it would be practically impossible to give any continued action from barium sulphide, as the rumen of cattle where these balls mostly occur, is very capacious." (Quoted from a letter addressed to Dr. Trout on December 23, 1914, by Dr. Mayo, and kindly transmitted by the former to Dr. Matas.)

References

1. Baudamant. Journal de Médecine, Paris, 1779, ii, 931.
2. Butterworth. Jour. Amer. Med. Assoc., 1909, liii, 617–628.
3. Moore. Boston Med. and Surg. Jour., 1914, clxx, 8–11.
4. Ledra-Heazlitt. Jour. Amer. Med. Assoc., 1914, lxii, 107–110.
5. Holland. Archives of the Roentgen Ray, July, 1913; ibid., March, 1914, p. 373.
6. Treplin. Beiträg. zur. klin. Chir., 1914, Bd. xcii, p. 317.
7. Schoenborn. Arch. f. klin. Chir., 1883, xxix, 609; Berl. klin. Woch., 1883, xvii, 260.
8. Carroll. Journal-Lancet, January 15, 1915.
9. Martin. Ann. Surg., 1914, lx, 764.
10. Kampmann. Münch. med. Woch., 1911, No. 8, p. 413.
11. Hüttenbach. Mitt. aus. d. Grenz., 1911, Bd. xxiv, p. 85.
12. Ramsbottom and Barclay. Archives of the Roentgen Ray, October, 1913.
13. Schwartz, K. Med. klin., 1913, No. 52, p. 2148.
14. Francke. Quoted by Lehman, Trans. Roentgen Congress, 1914.
15. Koogken. Zeit. f. klin. Med., 1888, xiv, 203.
16. Schulten. Cent. f. Chir., 1896, xxxi, 68.
17. Best. British Med. Jour., 1869, ii, 630.
18. Russell. Med. Times and Gaz. (London), 1869, p. 681.
19. May. Trans. Chirurg. Soc., London, 1855; Assoc. Med. Jour., 1855, ii, 1147.
20. Quain. Trans. Path. Soc., London, v, 14.
21. Jacobson, N. Med. News (New York), 1901, xxvi, 245.
22. Gemmel. Lancet (London), 1894, ii, 432.
23. Cannon. Amer. Jour. Phys., 1898, vol. i, No. 3.
24. Pell-Ilderton. British Med. Jour., January 5, 1907.
25. O'Hara. Wien. klin. Woch., 1895, No. 3.
26. Dandois. Bull. de l'Acad. de Méd. Belge, 1903, xvii, 1031.
27. Swain. Lancet (London), June 22, 1895, p. 1581.
28. Mermet de Hauteville. Jour. de Méd. Chir. et Pharm. Paris, 1813, xlviii, 147.
29. Wölfler and Leiblin. Deutsch. Chir., 1909, Lfrg. 466, p. 167.
30. Clairmont and Handek. Wien. klin. Woch., 1911, No. 19, p. 167.
31. Stelzner. Cent. f. Chir., 1896, No. 31, suppl., p. 121.
32. Paton. British Med. Jour., 1902, i, 147.
33. Ranzi. Wien. klin. Woch., 1905, No. 48.
34. Harvie. Jour. Amer. Med. Assoc., 1908, l, 513.
35. Turner. Quoted by Butterworth, loc. cit.
36. Thornton, J. Knowsley. Trans. Path. Soc. London, 1886, xxx, 199; Lancet (London), January 9, 1886, p. 57.
37. Hausmann. Deutsch. Arch. f. klin. Med., 1914, Bd. cxiv, p. 194.
38. Schreiber. Mitt. a. d. Grenz. M. u. Ch., 1896, l, 729.

39. Sprengel. Verhand. Deutsch. Gesselsch. f. Chir., April, 1912.
40. Caro. Cent. f. Chir. Beiträg., 1912, No. 30, p. 57.
41. Radley. British Med. Jour., 1913, ii, 280.
42. Fenwick. British Med. Jour., 1902, p. 1696.
43. Newbolt and Jones. Lancet (London), June 26, 1909, p. 1829.

DISCUSSION ON THE PAPERS OF DRS. SHERRILL, BROWN AND MATAS

Dr. Samuel J. Mixter, Boston.—I wish to say a word or two on Dr. Brown's paper. He emphasized a very important factor in these cases when he said, "Don't do too much." That is a mighty good rule to follow in all cases of abdominal surgery, especially of the acute type. In this case the operator was able to close the opening. I want to speak of cases where it is impossible to close the opening, and where sometimes the life of the patient may be saved without any extensive operation. I have had three such cases, one of perforation of a malignant pylorus, and two of perforated duodenal ulcers. In all three cases the patients were practically pulseless. There was no question of a prolonged operation, and the opening was found to be without any previous walling off, and into that opening (I will illustrate it diagrammatically on the board) a tube as large as my thumb was placed with openings on the side, and packed with a large mass of gauze around in this way (indicating); that allowed practically the whole contents of the stomach and duodenum to pass out of the tube. This was done because there was nothing else that could be done, and to my great surprise the patients pulled through, and in both of the duodenal ulcers the opening closed spontaneously, and, strangely enough, these patients were so well afterward that they absolutely refused to have a further operation done. I saw one of the patients a year afterward, he was perfectly well, and had not a symptom that he had before perforation, but why, Heaven only knows. In the case in which the opening did not close—the cancer case—the man recovered from the shock of the perforation; the operation did not take more than three to five minutes; he recovered, lived two or three weeks, and finally died of the disease. He was in a wretched state from cancer of the stomach at the time. It only shows the advantage, as the reader of the paper says, in not trying to do too much.

Dr. Francis Reder, St. Louis, Missouri.—In connection with this subject I wish to relate two cases of the so-called punched-out type of ulcers of the duodenum. One patient, a carpenter, was struck at his work bench. He never had been very sick; once in a while he suffered from dyspepsia. The other patient, a negro about fifty-five years of age, had been about five weeks at the City Hospital for chronic rheumatism.

He was suddenly taken with a severe pain in his stomach while walking to his bed. A diagnosis of perforating duodenal ulcer was made. The operation which was performed immediately verified the diagnosis.

In the case of the carpenter, a private patient, operation was performed about eight hours after he was stricken. The opening was round and not quite as large as a lead-pencil. It was closed without much difficulty, a piece of omentum was grafted over the suture line. This patient recovered.

The ulcer in the negro had marked callous walls. The opening readily admitted the end of the index finger. It was impossible to close the opening, the sutures would not hold and the neighboring tissues were so sclerosed that they could not aid in closure of the opening. The patient's condition was poor, so as a dernier measure the ulcer area was walled off with gauze and drained. This patient did well for seven days. On the ninth day he suddenly expired

A fistulous tract created in this manner often heals kindly. This has been my experience with fistulous tracts following cholecystenterostomies made with suture in which leakage has taken place.

Dr. Henry O. Marcy, Boston.—Dr. Matas tells us some wonderful things, and I have listened to him today in relating this case of removal of a large hair-ball from the stomach with the same interest I have in former years. I should like very much for him to come to Boston, as I think we can teach him something about hair-balls.

We have the only method I know of, where the sewage of our city is taken to great tanks or reservoirs and carried with the outgoing tide to the sea. Singularly, we find floating on the tops of these reservoirs certain black balls. We simply throw our corks into the water-closets; the fat from the kitchen sink, which Bridget so carelessly wastes, is gathered by her mistress. This warm fat catches the hair and when the fat cools it makes a ball which floats upon the surface. With the usual Yankee

shrewdness we pick that off and sell the product for about $15,000.00 a year for soap grease. (Laughter and applause.) Most of you know that it is not at all uncommon in cattle. I suppose most of you have seen these hair-balls.

Some time ago I was at one of the great butcher shops in the vicinity of the city and I was shown half a dozen hair-balls from the stomachs of cattle. They were just as beautiful and of as clean-cut variety as you would find under any hat, and in thick envelopes as dry material. So hair-balls in cattle are not such a rarity, and hair-balls in Boston are very common.

Dr. Charles H. Mayo, Rochester, Minnesota.—I had a case last spring similar to the one reported by Dr. Matas. A girl, twelve years of age, who had had scarlet fever at the age of six. She was sick for a long period. She did not look sick, but she could not eat much. She was hungry all the time and vomited. A careful examination, including *x*-rays, was made. There was something about the case that we could not exactly understand, but at any rate, there was a tumor of the stomach. I opened the abdomen and took out an enormous hair-ball nine inches long and four inches through which weighed three pounds. It was the shape of the stomach.

This case reminds me of another one on which Dr. Ekehorn, of Upsala, operated two or three years ago, removing a hair-ball. The history given was that the girl had increasing trouble during the last two or three years.

With reference to the paper of Dr. Sherrill, there are three cases on record of diverticulum of the lower end of the stomach in which the pylorus was involved. One case I reported two years ago, in which I resected the pylorus. Most of it was in a benign condition, but in part of it there was beginning carcinoma.

The case reported by Dr. John Young Brown was interesting. There can be no question that it proved the benefit of the two-stage operation, and especially the jejunostomy which saves many bad cases. It builds them up and carries them along over the acute stage and later some operation can be done.

Dr. John C. Oliver, Cincinnati, Ohio.—Twelve or fourteen years ago I had a patient, a young girl, about nine years of age, who came from the mountains of Kentucky, and was very properly named Vendetta. She presented herself with two tumors in the epigastric and left hypochondriac regions, without any history of serious illness, and yet these tumors were readily palpable and were quite large. This, of course,

was before the time of bismuth and before the advent of the x-ray pictures of the stomach; but we felt inclined to believe that this was a malignant tumor of the stomach. In making an exploration we found it was not a tumor outside of the stomach, and on opening it we found there were two large masses in the stomach the nature of which we did not know, but after removing them we found they were masses of persimmon seeds and skin and twigs and leaves. These masses subsequently filled a full quart Mason jar. We removed these masses. In going back over the history of the case we were told they had cut down a persimmon tree, and the child was warned not to go near the persimmon tree, with the usual result of most prohibition laws. (Laughter.) After the child recovered she developed an antipathy to persimmons.

Dr. Thomas S. Cullen, Baltimore.—Sometime ago I removed an appendix from a little girl five or six years of age, and a few days later was told by the pathologist that he was able to tell the color of the patient's hair. There were several long strands of her hair curled up in the appendix.

In connection with the differential diagnosis of stomach tumors, a case recently related to me by Dr. Elliott, of Philadelphia, may be of interest. He sent me a slide of the tumor for diagnosis. The patient had a tumor the size of an ordinary cocoanut attached to the lower part of the stomach by a pedicle about the size of one's little finger. This tumor was perfectly smooth, pinkish in color.

On histological examination it was found in certain areas to consist of myomatous tissue; in other areas the spindle-cells were arranged around the bloodvessels strongly reminding one of a perithelial angiosarcoma. Whether it was malignant or not I cannot say. I have never seen a sarcoma as large as this that did not contain areas of coagulation necrosis. There was much hyaline transformation but no fragmentation of nuclei. Furthermore, this tumor was free from adhesions. I am inclined to think that it was benign.

Dr. Le Grand Guerry, Columbia, South Carolina.—In discussing the paper of Dr. Matas I wish briefly to report a case. The patient was a woman, about forty-five years of age, with a diagnosis of acute intestinal obstruction. She was operated on through a median abdominal incision. The tumor producing the obstruction was readily found and removed, which relieved the obstruction. On examination of the tumor

it was found to be a hair-ball the size of an ordinary hen's egg or smaller, with a distinct cast of fecal matter which coated the outside of the tumor.

I mention this simply as one of the interesting features in explaining certain cases of acute mechanical ileus.

Dr. W. P. Carr. Washington, D. C.—Dr. Matas has opened up a very interesting field for discussion. I want to call attention to the fact that there is a very fine collection of hair-balls in Washington in the Surgeon-General's Museum, including those taken from human beings and animals.

I want to say a word or two about Dr. Brown's paper. I am very glad he brought up the subject because I have been at a loss what to do in duodenal ulcers where we find a little punched-out hole, and the tissues all around that are so thick and so cheesy that they will not hold a suture. I have tried to sew up some and have found it was absolutely impossible to do so. In two such cases I resected the pylorus, with good results, removing a third of the stomach in order to get good healthy tissue. In these two cases, after resecting, without suspecting malignant disease, the laboratory report was carcinoma. Both of these patients today are still in good health. In one the operation was done two years ago, and in the other about a year ago. In one of these cases the duodenum was so small that I was afraid to trust it after turning in good flaps so as to bring the peritoneal surfaces together, and I did a gastro-enterostomy also. I have been sorry since that I did it because the patient has much bile in the stomach, and now and then vomits bile. In the other case, where I did not do a gastro-enterostomy, the result has been apparently perfect.

A year ago I was called to see a friend, a doctor, a few minutes after a sudden, violent attack of pain. We thought it was gall-stones. I operated on him, fortunately, within an hour, and found a perforated ulcer of the duodenum. It was a clean round hole one-quarter inch in diameter. I found it absolutely impossible to close it because of the soft, thick, cheesy consistence of the duodenum for half its diameter. I did a posterior gastro-enterostomy, packed with gauze and he made a quick and perfect recovery.

I think the idea of putting a tube in the hole is an excellent one. It is safer than resection, simple packing with gauze, or any other method with which I am acquainted.

ROSWELL PARK, M.D.

IN MEMORIAM

ROSWELL PARK, M.D.

Roswell Park was born May 4, 1852, at Pomfret, Connecticut. He was the son of Rev. Roswell Park and Mary Baldwin Park, both of whom were descended from English ancestors who came to America on the Mayflower. He died February 15, 1914. His father, the author of several well-known hymns, founded Racine College, Wisconsin, and there the son received his baccalaureate degree in 1872, and subsequently the master's degree. In 1876 he was graduated from Rush Medical College in Chicago. In 1880 he married Martha Durkee, of Chicago, who died in Buffalo in 1899. Two sons were born of this union, Roswell, Jr., now engaged in business in Buffalo, and Julian, of the faculty of the recently-established Arts and Science Course of the University of Buffalo. His sister also survives him.

It was said of him "that of all men who had completed their life-work in our profession in Buffalo, Roswell Park achieved the highest degree, not merely of eminence, but of greatness."

Dr. Park's professional career may be epitomized as follows:

1877–79, demonstrator of anatomy, Women's Medical College, Chicago.

1879–82, adjunct professor of anatomy, Chicago Medical College.

1883, called to Buffalo as professor of surgery, University of Buffalo.

1884–93, surgeon, Fourth Brigade, N. G., New York.

Possessed of a logical intellect and a clear and delightful style, Dr. Park was well known as an author, his authorship being of that highest type inspired by definite knowledge and the possession of a useful message. Thus, even when the subject was not a technical one and the title might suggest an academic standpoint, his writings always showed a strong, practical trend.

Dr. Park has been spoken of as a many-sided man, and he sometimes used to refer to himself in jest as a general specialist. Perhaps it would be more correct to say that he showed one concentrated mental proclivity: To base his work on the bed-rock of fact, to build broadly and strongly, and that such an intellectual edifice could not but serve many useful purposes. Thus while a skilful and—for post-anesthetic days—a rapid operator, he was a surgeon in the broader sense, rather than chirugeon in the original meaning of the term. He was one of a comparatively few surgeons who did not use knife-blade sights in aiming at a case. For this reason, when he did decide upon operation, his own confidence and that of his associates was greater, and his attack definite and decisive. While his early experience as a teacher of anatomy was of great value to him as an operator, his research work along lines of pathology and bacteriology, his theoretical and practical grasp of the principles of antiseptic and, subsequently, of aseptic surgery, at an early date in their development, were of equal value from the standpoint of technic, they characterized his teaching and authorship and prepared him for future tasks of even greater importance. It was concentration of energy rather than versatility in the ordinary sense that made him a useful member of the Buffalo Society of Natural Sciences, that led the American Association for the Advancement of

Science to elect him to the presidency. His early studies logically led to a conception of the necessity of a serious study of cancer and made him the prime mover in the establishment of the New York State Institute for the Study of Malignant Disease. The same logical extension of interests may be seen in his early and persistent studies of radiant energies, although he never posed as a physicist or chemist or devoted himself technically to roentgenology. Truly wonderful was his grasp of general principles and power to assemble facts, as well as his constant effort toward securing practical humanitarian results from what might appear to the superficial observer as mere scientific abstractions.

Like most other men who have achieved greatness, Dr. Park was a man, a gentleman, a good citizen, and a good friend, and not merely a highly efficient mental machine. Hence, we find him identified with and honored by various organizations apart from the local and general professional organizations, membership in which may be taken for granted, and in which he naturally played a prominent part. He had been president of the Buffalo Saturn and University Clubs of Buffalo; he was a life member of the Buffalo Fine Arts Academy and of the Buffalo Historical Society; a member of the Park Club of Buffalo, of the University Club of New York, and of the Army and Navy Club of Washington. Membership in the last may be considered a professional affiliation, since he was a first lieutenant in the United States Medical Reserve Corps and a non-resident professor in the Army Medical School. He was an amateur musician and composer of no mean ability, and exerted a strong influence in the development of musical culture in Buffalo, although too much occupied with other matters to have made this side of his life prominent or even to have made it known to many of his professional associates. Logical incidents in his life, rather than significant landmarks, are the recep-

tion of an honorary degree of M.D. from Lake Forest University, of an honorary degree of A.M. from Harvard, and of the degree of LL.D. from Yale.

As a teacher, didactic and clinical, and, to some degree, as a popular lecturer, Dr. Park was clear, interesting, and practical. Beginning his career as a medical teacher in the days when medical colleges were still in the evolutionary stage typified by the "little red school house," he was not content merely to fulfil routine duties conscientiously, but as one of the most persistent workers toward securing a curriculum, equipment, and system of pedagogy in medicine, consistent with the highest standards of education in general. In this respect his influence was more than local. Called to the professorship of surgery in Rush Medical College in 1890, his decision to remain in Buffalo led the profession to tender him a banquet in appreciation of his loyalties to ties so firmly established. This invitation had more than a personal significance. In fact, every personal honor that Dr. Park received was reflected in an altruistic way. The recognition of Dr. Park's attainments came at a time when professional sentiment and legislation were demanding greater things of medical education. The signal honor conferred upon him emphasized to the profession and the public the fundamental worth and the present needs of the University of Buffalo; it gave an additional impetus to the forces already at work within the institution, and added to their influence upon the community and unquestionably hastened the concrete attainment of means to accomplish the educational ends so long desired.

In 1908 a similar banquet was tendered to Dr. Park, commemorating the completion of a quarter of a century as professor in the university. Dr. Park's attachment to the University of Buffalo was such that it is no coincidence that its welfare was on his mind and the subject of conversation on the evening before his death. His large private medical

library is bequeathed to the University of Buffalo and his instruments to the Buffalo General Hospital.

At three o'clock in the morning of Sunday, February 15, Dr. Park was seized with an attack of syncope and died within a few minutes.

Dr. Park published 155 articles between 1881 and 1914. His text-book on *Surgery* is one of the notable American contributions to surgery.

GEORGE E. GAVIN, M.D.

Dr. George E. Gavin was a member of the Southern Surgical and Gynecological Association since 1901. He died at his home in Mobile, Ala., November 14, 1914; he had been ill for several years, having had an extirpation of the kidney for calculus. He recovered from that, but had been under treatment for nearly a year, although not serious enough to oblige him to discontinue his work. The terminal lesion was a malignant one.

Dr. Gavin was forty-three years of age and had practiced surgery in Mobile for twelve years. He was born in Choctaw County, Alabama, and received his degree at the Louisville Medical College in 1896. He served as an intern at the Louisville City Hospital, and first took up his practice in Mississippi, where he did a large general work. He moved to Mobile in 1902 and restricted his practice to surgery. In 1910 he made an extensive tour of the European clinics, studying some time in Vienna.

He was a man of strong physical vigor, of pleasing personality, and unremitting devotion to his scientific work. He was greatly beloved by his professional colleagues, and his untimely taking off at the zenith of his most useful scientific activities was a great loss to his profession and to the community which he served.

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